Popular Mechanics Magazine

REGISTERED IN U. S. PATENT OFFICE

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 27 JANUARY, 1917 No. 1

Spotlights to Protect Traffic Officers

AT certain street intersections in St. Louis, where traffic officers have frequently been struck by passing automobiles in dark and foggy weather because of their low visibility, they are now protected by searchlights installed on near-by buildings, which clearly reveal their presence to approaching motorists. The lights are of the nitrogen-tungsten variety, high-powered, and mounted in reflectors. Placed at the second or third story of a corner building they flood with a bright white light the spot where the officer stands. At one street corner in the West End the light is mounted at the top of a seven-story hotel. The spotlights were adopted after several other methods had failed.

Spotlight System Used in St. Louis to Protect Traffic Officers in Dark and Foggy Weather. Luminous White Gloves and White Oilcloth Coats, Previously Tested Out, Failed to Render the Officers Visible in Dense Fogs

THE ZEPPELIN OBSERVATION CAR

By LEWIS R. FREEMAN

SO far as giving any hint of what it really was to the farmers of the east coast of England who first discovered it, the Zeppelin observation car recently on exhibition in London might well have dropped from another planet. It had been rumored ever since the raids on England began that the Zeppelins were provided with some sort of contrivance which could be lowered below a screen of clouds for observation purposes, while the airship itself hovered in the comparative security of the higher altitude. Possibly the British authorities possessed full knowledge of what this contrivance really was, but certainly it would be hard to imagine a picture more differing than was the popular conception of the observation car from what the real thing proved to be. Pictures drawn of it—from fancy, of course—in the newspapers, and even in the scientific press of England, always showed it as something of the nature of an armored miner's cage, a steelplated box capable of withstanding the fire of heavy artillery at fairly close range; whereas the real thing proved to be made of sheets of aluminum so thin that one might hope to puncture it with a vigorous thrust of a penknife blade, and so light that, standing under it where it was suspended, I was able to take the whole weight of it—not much over a hundred pounds—on the heel of my upraised hand.

The 3,000 feet or more of ⅜-in. cable, together with the aluminum winch upon which it was wound, could be lifted with ease by one hand. The cable, which is made of several small wires of what appeared to be an aluminum alloy, wound round a somewhat larger central wire, is extremely light and pliable, winding onto the winch like oiled-silk fishline, and with as little tendency to kink. The central wire served for telephone communication between the car and airship, a combination receiver and transmitter having been found in the former.

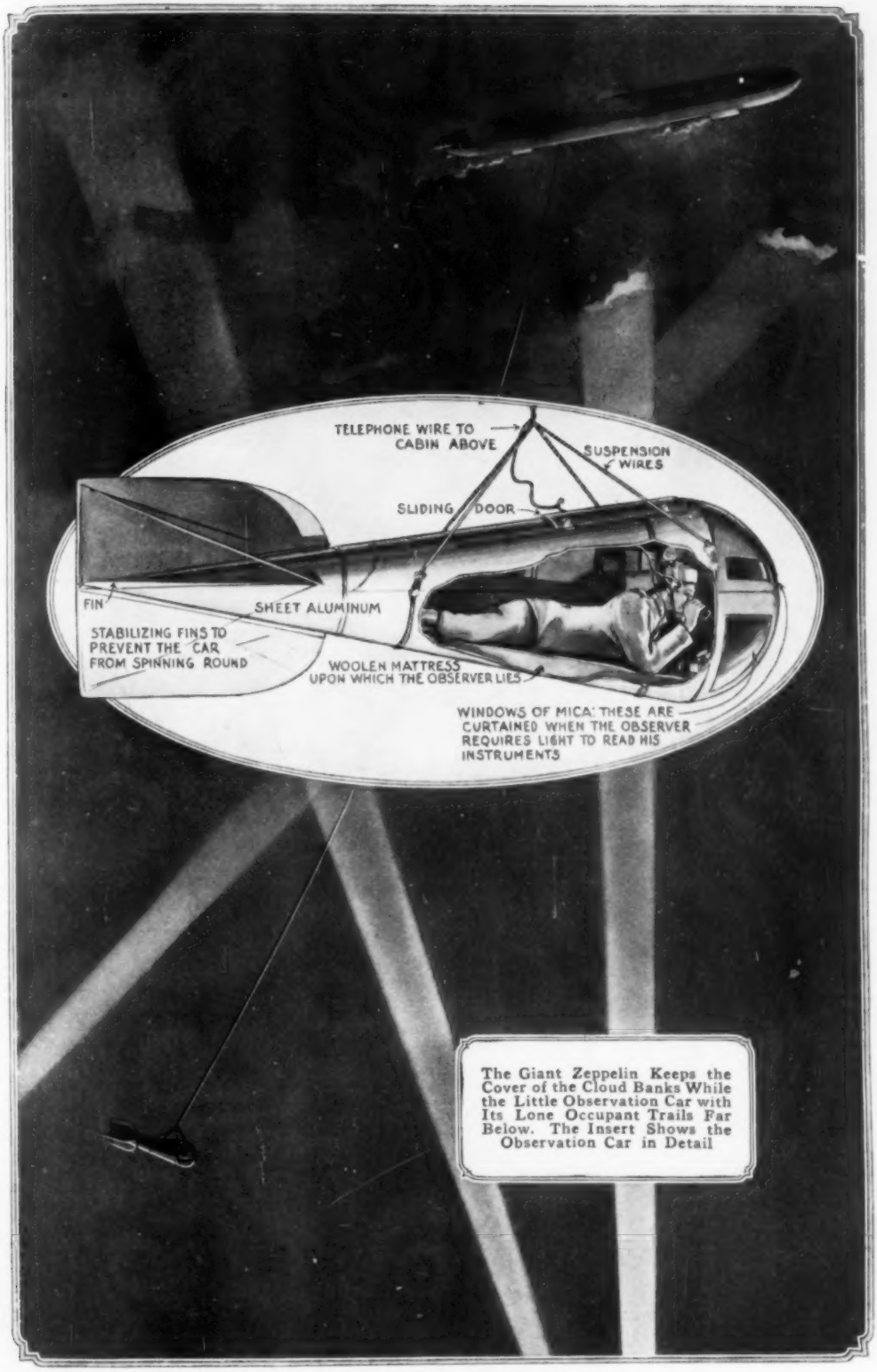
For a description of the observation car itself I cannot do better than give that of the man who first chanced upon it while out rabbit hunting. "When I looked through the hedge," he said, "I saw this queer-looking thing with its nose in the ground among the stubble. It had evidently fallen lightly, skimming over the ground for several yards. The wire was trailing off across the field out of sight. I guessed it might have been left by the enemy, and so cocked my gun while I looked to see if anybody was at home.

"It was a snug box of aluminum, shaped like a headless fish. Into its blunt end was let two small windows of mica. There were two more such windows at side, bottom, and top. Each window was curtained, and between them—on the bottom of the car—was a mattress upon which the observer had lain. By slipping a curtain he could look out in any direction he wished. Within easy reach from the mattress were a compass, clock, glasses, three or four electric batteries, and a sort of shelf holding some wire-bound equipment of various kinds. Two electric-light bulbs were so placed as to throw light in any direction. Into a part of the fore end was stuffed some sort of grass.

"Behind the mattress, where the car tapered down to the tail, there was empty space. The length was 14 ft., and the diameter at the head about four feet. On the outside of the tail was a sort of four-flanged extension, like a double fin, evidently designed to keep the car steady in the wind or when in motion."

There is not much to be added to this description. The car was suspended by wires looped under the head and tail, and where the four ends were joined to the cable reaching up to the Zeppelin there was a stout steel spring—about four inches in diameter and a foot long—doubtless intended to take up the vibrations and make the car ride easier.

It appears not to be definitely known just how this car came to be aban-


TELEPHONE WIRE TO CABIN ABOVE
SUSPENSION WIRES
SLIDING DOOR
FIN
SHEET ALUMINUM
STABILIZING FINS TO PREVENT THE CAR FROM SPINNING ROUND
WOOLEN MATTRESS UPON WHICH THE OBSERVER LIES
WINDOWS OF MICA: THESE ARE CURTAINED WHEN THE OBSERVER REQUIRES LIGHT TO READ HIS INSTRUMENTS

The Giant Zeppelin Keeps the Cover of the Cloud Banks While the Little Observation Car with Its Lone Occupant Trails Far Below. The Insert Shows the Observation Car in Detail

doned in England, though the fact that what was the upper end of the wire shows evidences of having been cut would seem to indicate that it may have been dropped by a hard-hit Zeppelin desirous of ridding itself of all unnecessary weight before venturing back over the sea. No trace of the observer has ever been discovered, and it is not believed he was in his place at the time the car was cut loose.

The fact that no observation cars have been reported as being found among the wreckage of any of the three Zeppelins recently brought down in England would seem to indicate that this contrivance is only employed by special "scout" airships, whose duty is to see rather than destroy, and to report their observations to the fleet with which they are operating by wireless telegraphy.

CHEERFUL GLOW GIVEN OFF BY ELECTRIC RADIATOR

Convenient during crisp mornings in spring and fall when steam and hot-water systems are either not in service or slow in generating heat, is a portable electric radiator of a new type. It

A Separate Switch Controls the Incandescent Lamp so That It may be Used or Not, According to the Wish of the Individual

is finished in nickel, and near the top, in a curved deflector, is supplied with a frosted globe that gives off a warm, cheerful glow. This makes the device well suited for use on a magazine table cool evenings, for not only does it throw off heat, but the light from the lamp is quite adequate for reading purposes. In this capacity it is an especial comfort for the woman who is subject to feeling chilly about the shoulders and requiring a light wrap when seated in a slightly underheated room. The appliance is 20 in. high, a foot in width, and has a handle near the top by which it may be carried from one room to another as needed. It may be attached to any lighting socket conveniently located, and will, it is said, take the chill out of a room of moderate size in a comparatively short time.

NEW AIR RECORDS SET IN LONG FLIGHTS

Two remarkable aeroplane flights resulted recently from attempts made, first by a man and then by a woman, to fly without a stop from Chicago to New York. While neither succeeded in doing all that was planned, new American nonstop records were set, first by one and then by the other, final honors resting with the woman. On November 2, Victor Carlstrom started from Chicago at sunrise in a 200-hp. Curtiss military biplane and flew to Erie, Pa., a distance of 452 miles, without a stop in 4 hr. 17 min. 30 sec., which made a new cross-country record. Again descending at Hammondsport, N. Y., for the night, he continued to New York next morning landing on the parade ground at Governors Island at 8:55 a. m., in the presence of Maj. Gen. Leonard Wood, commanding the Department of the East. The total distance flown by Carlstrom was 967 miles and his flight time 8 hr. 28 min. 30 sec.; average speed, 114 miles an hour. He carried mail from Chicago for the Post Office

Victor Carlstrom Making His Landing at Governors Island, New York Harbor, after a Record-Breaking Flight by Military Biplane from Chicago. The Insert Shows Major General Wood Photographed with Carlstrom

Department, which was interested in the time and method of the trip.

Ruth Law, flying from Chicago at 8:25 a. m. on November 19, made her first stop, at Hornell, N. Y., 590 miles away, in 5 hr. 45 min., and thus captured the American nonstop record from Carlstrom. She descended again at Binghamton, N. Y., as night came on, but continued to New York next morning, landing at Governors Island at 9:40 a. m. Her actual flying time from Chicago to New York was 9 hr. 1 min. Prior to this flight Miss Law had never flown a greater distance than 25 miles at one time, and her achievement was all the more remarkable because the aeroplane she used was an old-model Curtiss, with the pilot's seat on a projection in front, where she was exposed to the weather save for a small aluminum foot shield. Carlstrom in the latest model Curtiss biplane was seated in an inclosure, protected from the weather by an aluminum cowl, while his machine had a spread of wings more than double that of the antiquated model used by Miss Law. Her winning of the nonstop record therefore speaks volumes for her daring and skill as a pilot, and Carlström was one of the first to congratulate her on her success.

COPYRIGHT, INTERNATIONAL FILM SERVICE

Ruth Law in the Small Curtiss Scout Biplane in Which She Made the Nonstop Record of 590 Miles during Her Flight from Chicago to New York

RAISING AN AUTOMOBILE FROM RIVER BOTTOM

When a midnight accident sent a limousine to the bottom of the Chicago River recently, through an open draw of the Twelfth Street bridge, steps were promptly taken to recover it, in order to remove the bodies of three persons, a man and two women, believed to be drowned in the car. A city diver soon located the limousine, 20 ft. from the bank of the river, and a scow bearing a large derrick was towed over the spot. The diver then rigged hoisting lines around the car, as it lay in the mud at the bottom, and it was raised to the street level. Four lives in all were lost in this accident, while two women who were thrown clear of the car as it fell saved themselves by swimming to piles along the river bank. The body of the owner and driver of the car was found floating a short distance from the bridge.

Three Bodies Were Recovered from This Automobile. It Was Raised by a Derrick from the Muddy Depths of the Chicago River

DEVICE INSTANTLY CURES CURIOUS FATAL DISEASE

An eminent surgeon, connected with a world-renowned clinic, has developed an apparatus for treating persons afflicted with cardiospasm, which effects a cure so suddenly that to the layman it appears little short of miraculous. Cardiospasm is a disease in which a contraction occurs at the point where the esophagus joins the stomach. Normally when food enters the lower portion of the esophagus a muscular ring, previously closed, relaxes and allows the food to enter the stomach. In this disease it does not open up normally and the food is retained above the ring. In some cases a huge pouch is formed by the accumulating food, while the patient slowly starves to death. In many such cases death has been attributed to cancer. Rather curiously, if a sound is lowered into the esophagus its weight may cause it to pass the contracted point, as though there were no obstruction there.

The device which treats the disease so successfully is an expanding dilator, which, after being inserted to the contracted point, is distended with water to a point where it paralyzes the muscle. Earlier attempts along this line were made with metal dilators but were found to be attended with some risk. A single treatment, or, in rare instances, a few treatments, completely relieve the condition. No pain accompanies the use of the dilator and no anesthetic is given. Patients unable to walk and literally starving to death have, in an instant, been restored

to a normal condition so far as bodily functions go, and immediately begin to regain health. One young woman receiving this treatment gained 17 lb. the first week.

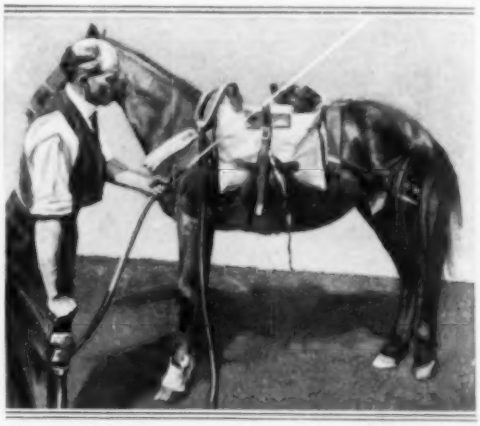
SIGN MADE OF CONCRETE TO REDUCE UPKEEP COST

In view of the fact that it is an item of considerable expense to keep an ordinary large sign in first-class condition by repainting and repairing it, a large manufacturer in the Middle West has used concrete in constructing a sign of large proportions. It is located on a steep embankment so that its tall letters and figures are clearly visible to all passers-by. The background was given a dark hue by mixing lampblack with the cement. The white letters are formed of fresh-water clamshells imbedded in the smooth dark surface of the concrete. If properly made, a sign of this character should last for many years without requiring any repairs.

Large Sign of Concrete and Clamshells: These Materials were Selected for the Purpose of Reducing the Upkeep Cost of the Sign

CANVAS WATER BAGS FOR USE OF FORESTERS

A canvas water bag that can be carried conveniently on a pack horse has been devised for the use of members of the United States Forest Service when it is necessary to transport water to places remote from a regular supply for drinking and cooking purposes. It can also be used to quench incipient fires, by means of a small hand pump carried along with it. The container is made of heavy cotton fabric without seams or patches, rendered water-tight by treatment with a mixture of paraffin and turpentine. Each bag has a capacity of 10¾ gal. of water, and weighs when filled about 98 pounds. Thus a pack load of two bags weighs nearly 200 pounds, exclusive of packsaddle and blanket.



Canvas Water Bags and a Hand Pump, Carried by a Pack Horse, are Used by the Forest Service to Quench Small Fires in Remote Places

LIGHTED GUARD POSTS FOR SAFETY ZONES

Illuminated guard posts, protecting the zones of safety in the middle of the streets where pedestrians stand to take street cars, have recently been installed in Oakland, Calif. These posts are approximately three feet high and are made of heavy cast iron to withstand the shock of possible collisions. A strong grated cap, within which are two powerful electric globes, forms the top of each guard. The lamps are lighted at night so that the posts can be seen by drivers of vehicles. The caps can be removed to permit cleaning of globes.

FRONT SEATS OF MOTOR CAR ARE EASILY REMOVED

Removable front seats, one of the features incorporated in the latest model of a standard motor car, prove very convenient at times, especially when there is a baby in the family that needs to be taken along on drives and short tours. By removing the seat at the right of the steering wheel, adequate space is provided for a small perambulator, or specially designed basket crib, that can be lifted into place, or taken out easily. This arrangement is particularly good when the tonneau is filled with passengers, or when a mother wishes to take a morning drive into the country with her baby. In this car the front seats can also be reversed so that they face the rear one. By doing this and folding down the collapsible auxiliary stools in the middle of the tonneau, plenty of room is available for a table about which five or six persons can gather conveniently when refreshments are served en route.

Plenty of Room for a Perambulator or Small Crib is Provided When the Seat is Eliminated

NANTUCKET AND MAINLAND JOINED BY PHONE CABLE

Telephone wires now connect Nantucket with Marthas Vineyard Island, and through it, the mainland of Massachusetts. This has been brought about within recent months by the extension of a submarine telephone cable, the longest underwater one in the United States, across Muskeget Channel. At the same time a new 12-conductor cable was laid across Vineyard Sound to Marthas Vineyard Island. The latter has the distinction of being one of the heaviest ever employed for transmission purposes. It weighs 10.6 lb. to the foot and is 2.69 in. in diameter, the size and weight being considered necessary on account of the strong tides encountered in the sound. The Nantucket cable carries six conductors and weighs about five pounds to the linear foot. The lead sheath in each instance is $\frac{5}{32}$ in. thick and heavily insulated with jute roving and armor wire.

The work was done by the cable ship "Robert C. Clowry." The cable was wound from the landing stage at Woods Hole to a large reel, of about three-mile capacity, situated on the forward deck of the boat. As the winding was done from the smaller spools the separate lengths were spliced. Subsequently the cable was payed out through a block attached to the outer end of a derrick boom. When it came to landing the cable, the vessel was anchored a short distance from shore in direct line with the cable box, situated about 150 feet back from the water's edge on the bank. A launch carried a line attached to a steel cable inshore. After being drawn onto the beach, the line and cable were passed through a block and carried back to the steamer's winch. As these were pulled in, the telephone cable was payed out, landed, and finally extended through a trench to the box.

One of the First Steps in the Ordinary Process of Splicing a Cable

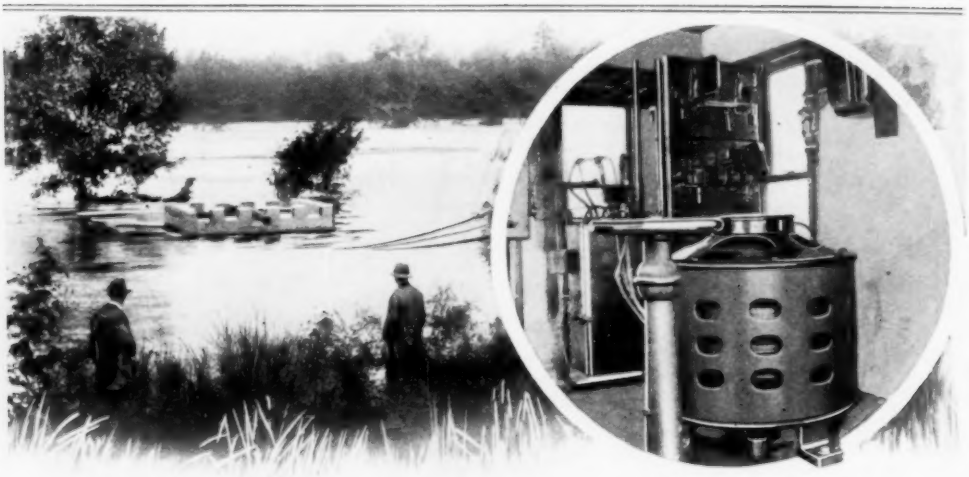
The Cable House on Marthas Vineyard Island, Situated a Short Distance from the Water's Edge: One Terminal of the Underwater Line

The Cable Steamer "Robert C. Clowry," Which Laid the Heavy Cables across Vineyard Sound and Muskeget Channel to Connect Marthas Vineyard Island and Nantucket with the Mainland

The Cable Emerging from Vineyard Sound, Buoyed by Barrels. It was Drawn In by Passing a Line through a Block on Shore and Pulling It with the Ship's Winch

Splicing Two Cables aboard the "Clowry": Coating the Heavily Insulated Conductors with Liquid Paraffin

The Vessel, Its Prow Barely Visible Here, Taking Aboard Cable from Reels Mounted on Flat Cars Alongside. This in Turn was Payed Out from a Large Spool on Deck through a Pulley Block Attached to the Ship's Derrick Boom. The Boat Handled Some of the Heaviest Cable Ever Laid



View of the Flood at Its Height, Showing the Water Almost as High as the Roof of the Concrete Power Station. When the River Receded the Motors were Coated with Mud. Insert Shows Part of Electrical Equipment Which was Put in Operation without being Allowed to Dry Out, after having been Submerged for 36 Hours

DRUGGIST'S PUMP FOR FILLING BOTTLES

The filling of a small bottle from a large one or the pouring of a thick liquid, such as glycerin, into a narrow-mouthed bottle, is made quite easy by the use of a pump which has been designed for drug stores by a resident of St. Cloud, Fla. The device is made of brass and consists of a tube, to one end of which is attached a pump barrel containing a plunger held in position by a coil spring. To operate, the pump is allowed to rest on the bottom of the large container. By pressing the plunger down with the hand and then releasing it, so that the spring can raise it up to its former position, the liquid is forced through the pump and out the curved end, which serves as a spout. When not in use the spout can be turned upward to prevent dripping.

MOTORS RUN AFTER BEING SUBMERGED FOR HOURS

After having been submerged by a recent flood for 36 hours, three electric motors, which supply the city of Rock Hill, S. C., with water, started up promptly when current was applied, in spite of the fact that the coils and equipment had been given no opportunity to dry. Water from the Catawba River rose to the roof of the city's power plant which housed the three motors, two of which were 100-hp. and the third 7½-hp. When the flood receded linemen found the switches, instruments, and connecting bars, as well as the motors and their oiling systems, clotted with river mud. As the water in the standpipe was low, it was necessary to start pumping almost immediately to prevent a shortage. Accordingly the equipment was hastily cleaned with a hose and brushes, and a new intake pipe laid to supplant the one filled with mud. Then the current was applied and the motors started up without any trouble.

¶An investigation by the Department of Agriculture shows that blight-killed chestnut wood is just as durable as healthy timber.

FLOATING POLICE STATION FOR NEW YORK HARBOR FORCE

By HENRY JAY CASE

NEW YORK CITY harbor police have a station house that goes to sea and passengers homeward bound from Europe need not think they have "got 'em again" when they meet it, green lights and all, rolling toward them on the deep Atlantic. It is not built of brick, to be sure, nor four stories high, with stone steps and pillars, but it has the familiar front office with the lieutenant's desk and blotter, the captain's room, the back room for the reserves, and the dormitory upstairs.

The New York harbor police have over 500 miles of waterway to patrol in and around the rivers, the Upper and Lower bays, the Sound and the distant reaches of the Atlantic, all inside the Greater City. This territory is divided into four harbor subprecincts, "A," "B," "C," and "D," all of which until recently had their station houses in permanent locations ashore. But last summer Arthur Woods, the present police commissioner, in his plans for police preparedness, directed that "Harbor B," as they refer to the Harlem River station, should go afloat so that in emergencies it might be possible to tow it to any location desired on East or North River, Long Island Sound, Upper, Lower, or Jamaica bays. Thereupon, he turned back to the city a $300,000 piece of water-front property on which the old station had stood for years and set the harbor police to work building a new station house on a deep-sea wrecking barge, 40 by 70 feet.

The station went into commission late in October. It is lighted by electricity and heated by stoves. Provision is made for steam connections to heat the house when the station is so moored as to be able to take such heat from whatever is alongside. The harbor men come and go in boats. The platoons or squads are "turned out" in crews, and when a call for help comes in it is received by telephone, wireless, or wigwag, and the response made by jumping the reserves to the scene of action in one of the lead-colored patrol launches. Sometimes the object of the call is a chase after river

COPYRIGHT, INTERNATIONAL FILM SERVICE

Harlem River Floating Station House of New York City's Harbor Police Force: It Replaces a River-Front Building Situated on Property Valued at $300,000, Which has been Turned Back to the Municipality

pirates; sometimes a fight; sometimes a search in the inky darkness beneath the wharves.

When not on emergency work, the floating station house, "Harbor B," will be moored off Randalls Island, in Harlem River, opposite the foot of East 125th Street. Here the police have also built a machine, blacksmith, and paint shop, a big wharf and a marine railway on which to pull up and store the boats that come into their possession through larcenies, or otherwise.

At the present time the harbor police navy consists of one 235-ton steamer, "The Patrol," which is the flag ship, six launches on continuous patrol duty, and one launch on reserve. The flag ship carries two one-pounders, besides machine guns, and each launch is equipped with a machine gun, and all with service ammunition. The crews have been instructed by United States naval officers in handling these guns, and have been given a course in wig-wag communication for signaling passing steamers and sail craft, and for keeping in touch with the shore stations.

With such distances as exist in New York Harbor and in the work cut out for them, harbor-police patrol stations are often far removed and out of touch with headquarters. The new floating precinct station will eliminate this inconvenience because it may easily be towed to any location where it is necessary to establish a temporary station. The wireless plant will make it possible to keep in touch with police headquarters in Centre Street, which already has a powerful wireless plant, a corps of licensed policemen operators and sixteen police "rookies" studying for their certificates in the police training school.

ICE BOX CHARRED BY FIRE KEEPS CONTENTS COOL

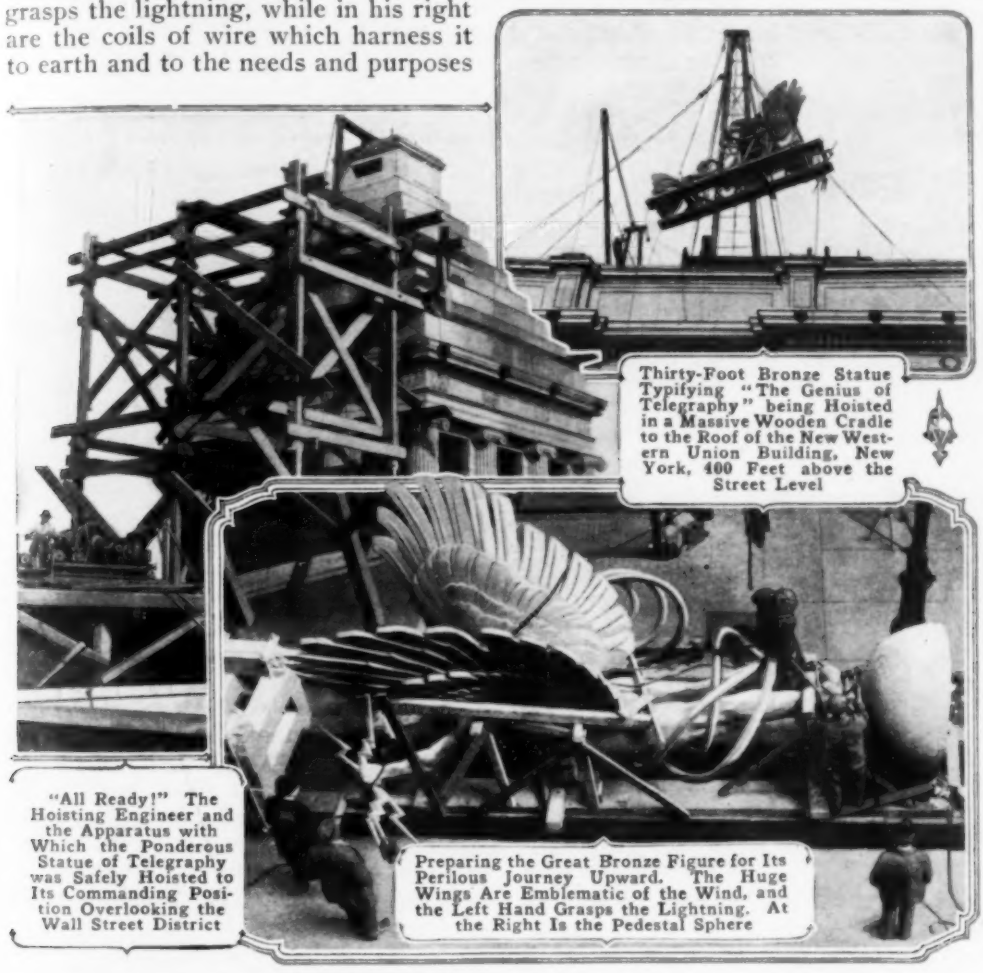
A refrigerator which recently went through a fire that partly destroyed a dwelling in Marfa, Tex., proved to be so substantially made that though the exterior was badly charred, the interior was unharmed and the contents was in no way affected by the unusual heat. Shortly before the fire broke out the ice compartment had been filled with 100 lb. of ice. The box was not opened until three days later and then it was found that there was about 25 lb. of ice left. The butter contained within the well-insulated walls of the box was sweet and firm, and all the other food was also in first-class condition.

Refrigerator as It Appeared When Opened Three Days after a Fire Which Charred Its Exterior. The Food It Contained Was in Good Condition and Even the Ice was Not All Melted

STATUE OF TELEGRAPHY HOISTED TO A ROOF

When a huge bronze statue typifying the wonders and progress of telegraphy was raised to the roof of the new Western Union Telegraph Building in Dey Street, New York, recently, thousands of spectators witnessed the operation. The statue is entitled "The Genius of Telegraphy," and is 30 ft. in height. It presents the figure of a man of heroic strength and power, mounted upon a terrestrial sphere.

The wings of the wind spring from his shoulders and in his left hand he grasps the lightning, while in his right are the coils of wire which harness it to earth and to the needs and purposes of man. The massive figure was raised by a derrick 400 ft. from the street level to the commanding position which it now adorns.



Thirty-Foot Bronze Statue Typifying "The Genius of Telegraphy" being Hoisted in a Massive Wooden Cradle to the Roof of the New Western Union Building, New York, 400 Feet above the Street Level

"All Ready!" The Hoisting Engineer and the Apparatus with Which the Ponderous Statue of Telegraphy was Safely Hoisted to Its Commanding Position Overlooking the Wall Street District

Preparing the Great Bronze Figure for Its Perilous Journey Upward. The Huge Wings Are Emblematic of the Wind, and the Left Hand Grasps the Lightning. At the Right Is the Pedestal Sphere

GERMANS BUILD ENGINES WITHOUT COPPER

Reports from abroad indicate that in their persistent search for a substitute for copper to be used in the construction of locomotives, the German engine builders have had at least a measure of success, although the question has been raised as to how long their copperless engines will last. The average German locomotive, built before the war made copper so scarce in central Europe, contained six per cent copper, by weight. Now the fire boxes and stays, formerly of that metal, are of cast iron. All the smoke and steam tubes, the oiling cocks, and thin pipes are of weldless drawn steel. For rod bracings, axles, grease boxes, and bracing parts cast iron is used together with a special alloy called flange metal, which is a mixture of tin, lead, and antimony. To avoid possible danger in the use of this metal, it is thought that pin and axle journals are bushed with white metal. In making other parts also, the use of copper has been dispensed with.

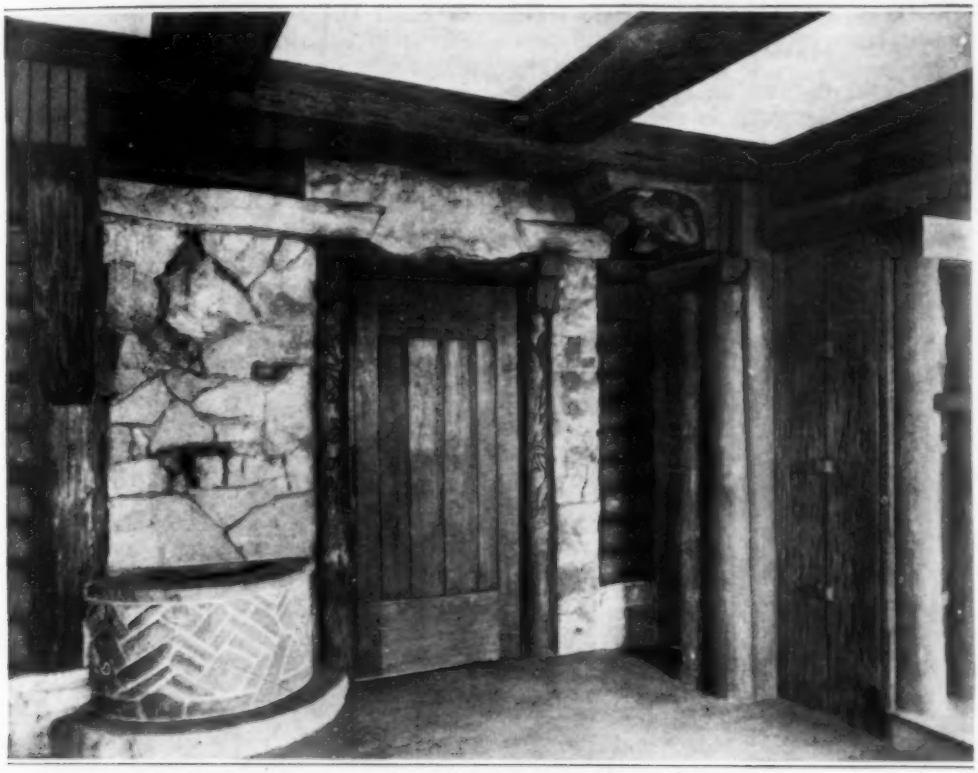
LARGE PORTABLE GAS LAMPS FOR FIRE FIGHTERS

Portable gas lamps of about 3,000 candlepower, fitted with straps so that they may be carried on the backs of firemen, have been adopted by the Cincinnati fire department. One of these devices weighs about 35 pounds, and furnishes a dependable, penetrating light for a period of six hours without requiring attention. The body is elongated and tapered, so that it will stand by itself when required as a spot or flood lamp. The burner, backed by a reflector, is held at one end of a pipe that may be adjusted to different vertical angles. This projects well above the fireman's head when the lamp is strapped in place, and allows the light to be cast in whatever direction is necessary. The equipment is suited not only for illuminating the interior of smoke-filled buildings, when electric circuits and gas service have been cut off, but also for exterior purposes.

WESTERN AIRMAN IS KILLED IN LANDING NEW BIPLANE

Several weeks ago while trying out a new biplane, Silas Christofferson, a builder of air craft and aeronautical motors, was killed at Redwood City, Calif. By a strange coincidence the airman met his death in a machine that had been constructed for a Nevada ranchman who was killed three days earlier at the same field while navigating one of Christofferson's military tractors. The birdman's unfamiliarity with the system of control installed in the new plane was responsible for the tragedy. He was accustomed to flying a machine equipped with a standard type of control operated with the shoulders. In the ill-fated craft the feet were used in regulating flight. Upon reaching a height of about 200 feet and attempting to make a landing, after a descent of several hundred yards, the airman momentarily forgot himself and tried to guide the craft to the ground with his shoulders, when he should have used his legs. The mistake came at a most critical instant and caused the biplane to plunge headlong against the earth. The flier was

Wreckage of New Biplane in Which Silas Christofferson, Builder of Air Craft and Aeroplane Engines, Met His Death Recently at Redwood City, California



Fountain Corner of a "Field Room" in a Michigan Residence, Finished in "Pecky" Cypress. Note the Longitudinal Holes in the Wood of the Door to the Right and in the Ceiling Beams

conscious when removed from the debris and gasped to his wife, who had been the first to reach him, the cause of the accident. He died at a hospital a few hours later and was subsequently buried beside Lincoln Beachey at a local cemetery.

"PECKY" CYPRESS USED FOR BUILDING TRIM

"Pecky" cypress is a grade of cypress lumber in which the wood looks decayed, because of numerous holes filled with a brown powder, but its appearance is highly deceptive, for it is in reality one of the most decay-resisting woods known in this country. After it is once cut from the tree it does not change in character, and as it resists all kinds of atmospheric and soil changes, it is much used in the South for planking, foundation timbers, fencing, railroad ties, farm buildings, greenhouses, and cold frames. Now the architects of the North are beginning to discover its possibilities for artistic use as exterior and interior trim. Several rooms in one of the largest residences in Michigan have recently been finished in pecky cypress with remarkable effect, as may be seen in the illustration. The pecky wood appears to be full of holes, varying in width from ¼ to ¾ in., these holes being found in the heart wood of the tree only, and then not until the trees have reached an age of 125 years or thereabout. The holes extend longitudinally up and down in the trunk, parallel with the wood fibers, and most frequently are 4 to 5 in. in length. They are separated from one another by layers of perfectly sound wood. When the brownish powder has been brushed out of the holes, the wood looks as if holes had been gouged into it.

CHECKERBOARD RADIATOR FOR AUTOMOBILE

A novel decoration for an automobile and one which is sure to attract attention is a radiator on which a

An Unusual Decoration for a Radiator Which It Took Three Days to Paint

checkerboard pattern has been painted. The task of painting such an unusual adornment is more arduous than one might suppose, due to the fact that the inside of each hole in the radiator must be painted to correspond with the front surface. In the automobile front shown in the accompanying illustration there are approximately 3,000 tiny hexagons. The entire radiator was given a coating of white enamel and then the painter set about painting the black squares. Three days were required to finish the work.

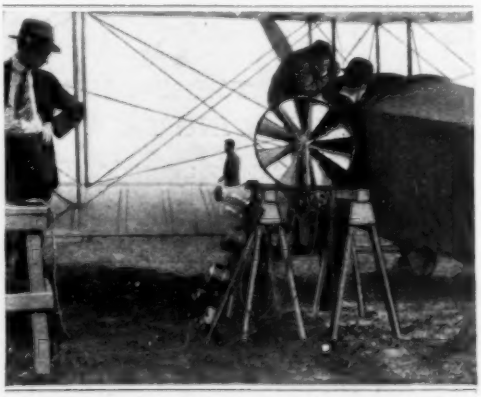
THE AMOUNT OF STEEL IN A BATTLESHIP

Nearly 151,000 gross tons of steel will be needed to build the 66 various new battleships, destroyers, and submarines, bids for the construction of which were taken by the United States Navy on Oct. 25, 1916. When these are added to our navy they will make it one of the most formidable in the world. In each of the four new battle cruisers there will be 15,025 tons of steel; in each of the four new battleships there will be 13,761 tons of steel; in the 20 new destroyers, 325 tons of steel each, and in the 30 new submarines, 186 tons each. A hospital ship and an ammunition ship will need 4,000 tons of steel each.

These figures give some idea of the loss in steel alone when one of these is sunk in battle or by a submarine. Taking $70 per ton as the average price of steel at present, these vessels mean an outlay of not less than $10,000,000 for the steel only.

SELF-GENERATING WIRELESS FOR AEROPLANES

Officers of the aerial branch of the United States Army are testing the value of various devices for generating wireless power for aeroplanes. In one device the principal new feature is a large fan, which is conveniently attached to the body of the aeroplane, spins around when the machine is in flight, and by means of a belt and suitable mechanism revolves the dynamo that furnishes current, and thus generates power for the wireless system. The rate at which the fan revolves depends of course upon the speed of the flight. The importance of the wireless in military aeroplanes causes all suggestions for its improvement to be examined with great care.



COPYRIGHT, AMERICAN PRESS ASSN.

Latest Device for Generating Wireless Power for Aeroplanes, in Which a Large Air-Driven Fan Serves to Generate Current

Salvaging Human Wrecks *from* War's Scrap Heap

IN THREE PARTS

By Searle Hendee

PART II—Repairing the Maimed

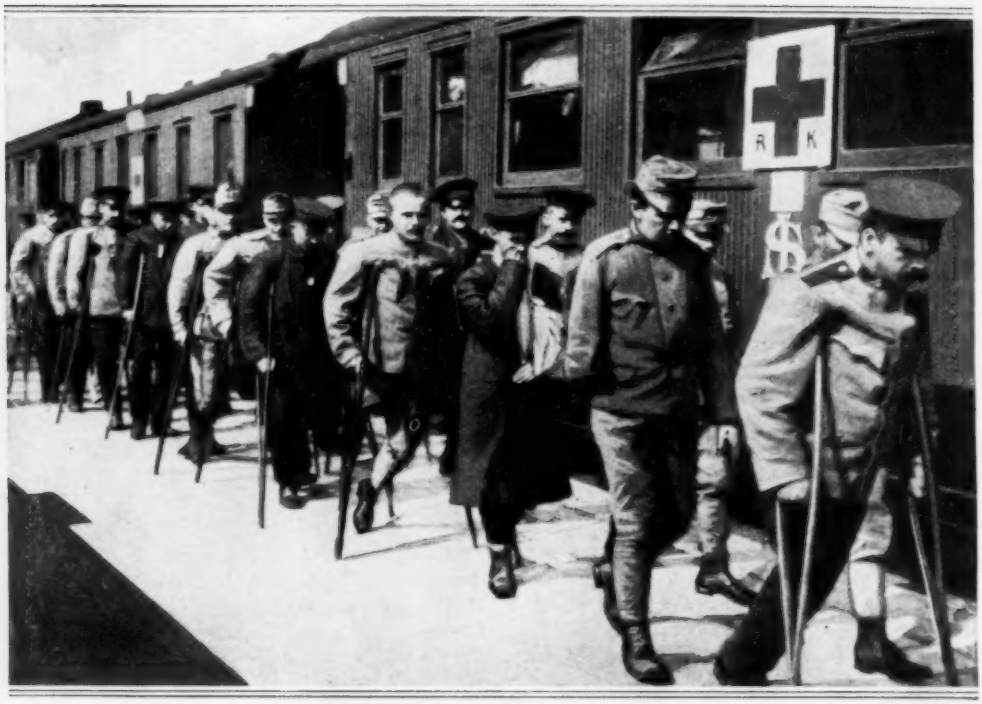
THOSE who have visited the capitals of Europe during the present cataclysm have witnessed a revelation. They have seen the meanest of soldiers under the care of world-famed practitioners. They have found that the war's human wrecks are being repaired, even rebuilt, without regard to class or racial distinctions, and that no man, whether friend or foe, is left in the trenches to die so long as a spark of life remains in him.

Horror and wonder are the primal impressions that bombard the mind, however, as the marvelous work of the war surgeons is studied at close hand; horror at what has been done, and wonder at what can be done. Men with metal jaws screened behind false beards, with artificial noses, ears, cheeks, eyes, and limbs, form the armies of the rebuilt. By means of plastic surgery whole new faces are made for some who are woefully disfigured, while others, maimed beyond hope of facial repair, are kept alive and fitted with copper masks. These sculptors of flesh-and-blood men work with amazing finesse. But some of their "studios" are chambers of unspeakable horror.

Unfortunately This Is Not an Unusual Picture, but a Very Common One. The Hospitals of Europe Hold Hundreds of Maimed Soldiers with Ghastly Facial Disfigurements, Many of Them Far More Awful than This One of a German Fighter Whose Rehabilitated Jaw is Being Fitted with New Teeth

The nature of present-day warfare and the enormous number of soldiers in active service combine to make the harvest of dead and wounded in single battles greater than the losses incurred during whole campaigns in our Civil War. Thus it has been possible for specialism to be carried out to a previously unheard-of degree. Entire hospitals are devoted exclusively to the treatment of some one kind of injury. In London, for instance, at one institution attention is directed to wounds of the jaw. Soldiers whose injuries involve the eyes, ears, nose, or throat are received at special hospitals. Those with maimed limbs are taken elsewhere, and so on.

Methods of transporting the wounded from field to hospital and administering to them while en route are now so well developed—except in the Alpine regions—that the surgeons often have opportunity to work on their patients while the wounds are still fresh and free from infection. Both medical and surgical men today are far better equipped



The Home-Coming, Another Common Picture: These German and Austrian Soldiers, All so Badly Maimed as to Make Further Military Service Impossible, have been Exchanged by the British, through the Courtesy of the Swedish Government, for Wounded "Tommies" Imprisoned by the Enemy

in every way than members of their professions ever were before. The X-ray, photography, electricity, new antiseptics and anesthetics, and greater understanding and skill are at their disposal. These are some of the many reasons why the wounded are getting excellent care and the surgeons are enabled to perform veritable marvels.

Every conceivable kind of ailment and injury is being confronted. But contrary to the popular impression, war, while creating multitudes of monsters and causing the art of surgery to make great strides of advancement, develops few, if any, new maladies. It does, however, make very common some diseases which normally are rare, and moreover it aggravates those that are usual. Much attention, for instance, has been attracted to the large number of soldiers killed and disabled

It Isn't Necessary to Serve in the Trenches to Become One of War's Great Army of Maimed. The Little Fellow in the Middle of the Picture, a Serbian, Was an "Innocent Bystander" Who Suffered from a Bursting Shell, Fell into the Enemy's Hands, and Became a Prisoner of War

COPYRIGHT, UNDERWOOD & UNDERWOOD

Off to Meet Their Daddies: A Joyful, Eager Procession of French Children being Escorted to a Railway Station. The Fathers, However, Are Not the Same Men Who Months Before Went Away to Fight. They are Hopelessly Crippled Men Who are being Returned through Switzerland from German Prison Camps

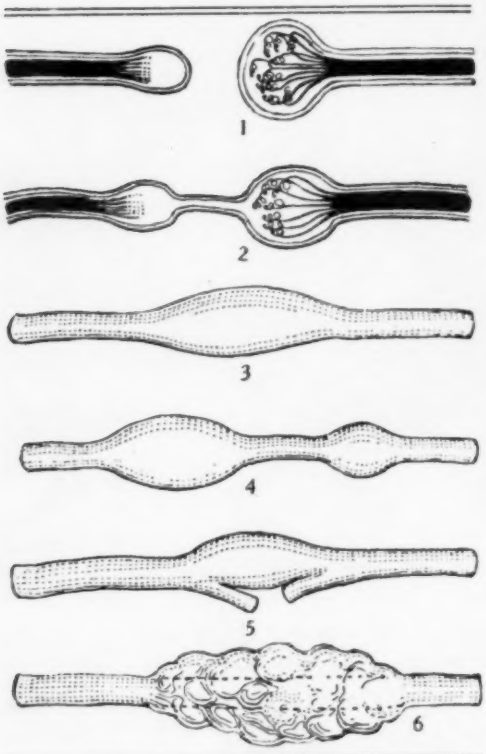
without outward manifestations of injury. Cases of this kind are generally due to what has come to be termed "shell shock," the concussion resulting from the bursting of high-explosive projectiles of big caliber. Deaths, brain afflictions, internal disorders, and the injury of certain organisms such as those of sight, hearing, and speech, are frequently brought about in this way. The condition is not a new one, neither is it peculiar to war, but it has become extraordinarily common.

Soldiers affected in this manner require the constant attention of specialists. They go insane, become partly paralyzed, lose their memories, grow unable to give or execute orders, and suffer general breakdown. For the less aggravated cases, complete rest away from the front often suffices as treatment.

COPYRIGHT, MEDEM PHOTO SERVICE

Home from the Front: This Father cannot See His Children, but He Has Lots of Time to Spend with Them, for He Is Blind and Jobless. He is Reciting the Thrilling Story of the Encounter in Which He Lost His Eyesight

Change of surroundings and freedom from noise and excitement bring about a gradual readjustment of the nervous

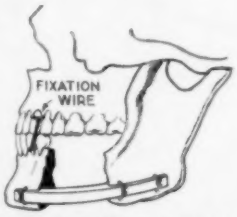


Ruptured Nerves: 1, A Nerve Entirely Severed; 2, Seemingly Connected, but Nonfunctioning; 3, Swollen by Concussion and Partly Impaired; 4, Same as 3; 5, Partly Severed Nerve Causing Partial Paralysis; 6, Bruised Sheath Responsible for Partial Disablement

system and sometimes enable a soldier to return to the trenches after a short leave. Not always so fortunate, however, are those whose nervous organisms are naturally weak. Years may be required and expert surgical treatment needed before balance can be restored. Autopsies performed on men who have been killed outright by shell shock have uncovered serious internal lesions, organic changes, ruptured blood vessels, and hemorrhages of the brain. Injuries about the spinal cord and the nerve centers are found in those who have lost their sanity. Coming from the trenches in an almost unbroken stream are men of lost personalities, men whose memories are completely blank, men who can write but not speak, men who are stone-deaf, men in a stupor, men who resemble sickening imbeciles, and others who are childish. Not all of them are successfully reclaimed, and eventually many of them may grow ravingly insane, but hundreds upon hundreds of them are being benefited through surgical attention and special treatments given under the supervision of famed neurologists.

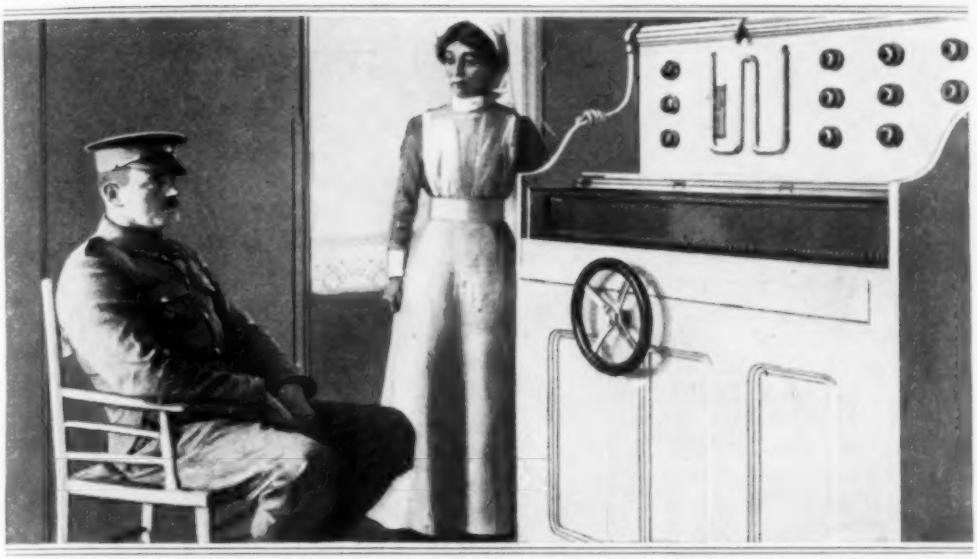
To be distinguished from shell-shock afflictions are the cases in which nerves have been severed or damaged by bullets or shrapnel. Injuries of this nature not only impair the brain in ways similar to those cited above, but also cause radial paralysis. Recovery of the patients depends upon the repair of the nerve itself. And in doing this the war surgeons are accomplishing some of their best work, for they are making strong, normal men out of many of those who otherwise would be either totally or in part helpless throughout the remainder of their lives. The tremendous number of cases of damaged nerve tissues has been responsible for the discovery of improved methods of repair which are proving to be of great importance.

A Berlin professor is the originator of a new way of mending nerves which has been found highly valuable. The operation consists in removing a section of an artery from some animal, filling it with embryonal nerve tissue, and employing it as a casing into which the disconnected nerve ends are inserted.



One of the Ways in Which Shattered Jaws are Repaired. The Inserted Bone was Removed from the Patient's Shin and Fitted into Grooves Cut for It

When this is done the members reunite with surprising rapidity, it has been found, and the previously paralyzed muscle or muscles again function. In one instance which serves as a particularly astonishing example, nearly two and a half inches of the ulnar nerve, which passes down the inner side of the arm and



Shell-Deafened Soldiers are Cared For in a Special Military Hospital at London Where Various Devices have been Made for Restoring Lost Hearing. Here a Machine Which Produces Sound and Electric Waves of Different Lengths is being Employed in the Treatment of a Patient

forearm, had been excised. Function was restored to the muscles within a few weeks after the operation had been performed.

Another German authority reports many cases in which he has successfully mended severed nerves by a lately devised method of suture. The process is especially noteworthy because it enables the nerve ends to be reunited without tension or hemorrhage, regardless of the distance between them.

Most of us during recent years have watched with admiration the strides made by some of our specialists in plastic surgery. We have read of, and some of us seen, how malformed noses have been reshaped, deformed mouths made almost normal, and deep scars partly eradicated. Wonders far greater than any of these are now being wrought almost daily in the hospitals of Europe, where whole faces are being reconstructed from the most heart-sickening masses of shredded flesh and pulverized bone. Engaged in this wonderful work are the most renowned orthodontists and dentists of the world, some of them Americans. Famed sculptors are also supervising the work in hospitals devoted to prostheses for hideous disfigurements of the face. The College of Sculpture, at Charlottenburg, near Berlin, is now a hospital in which the rebuilding of human faces is accomplished. After nature has been made to do all it can, the repairing is completed by transplanting bone taken from another part of the body, flesh from the abdomen, and skin usually from an arm. When it comes to providing teeth and a

Soft Rubber Castings are Made to Fill the Malformed Cavities When a Soldier's Eyes are Torn Out by a Shell. They Back the Hard Artificial Fronts and Form Elastic Contact with the Lids and the Bottom Parts of the Sockets

palate for the mouth, dentists usually take charge of the work.

An English ophthalmic surgeon has attained splendid results in using celluloid as a material for filling cavities, leveling depressed scars, and making up for the loss of bone. He has employed it both in solid and liquid form in many operations, and has had striking success in using it to replace bone when building up new noses. By placing plates of celluloid beneath them, he has been able to flatten deeply shrunken scars and in some cases has almost obliterated them. Of late, however, for work of this kind he has used the fluid preparation chiefly. In constructing new noses, the celluloid plates are used to form bridges. The arch thus provided is covered with whatever flesh of the original nose remains intact and by a wedge-shaped flap cut from the forehead. The latter is always left attached by a pedicle and turned down. Slits are cut along the outer sides of the wound to receive the edges of the plate so that they will not cut through the parts sewed together. The fluid preparation is celluloid dissolved in acetone. This is injected by a syringe through a tunnel cut from the edge of the normal skin to a point beneath the scar. When the latter rises above the adjacent surface, the syringe is withdrawn, the place smoothed, and the wound covered with collodion.

COPYRIGHT, INTERNATIONAL FILM SERVICE

The First Step: A Young Soldier Learning to Use Substitutes for Legs

Lesions of the jaw are particularly common in the present war. Frequently the lower member is entirely shot away, making it necessary to supply an artificial one made of metal. When only a section is missing, however, repair is possible. One way of doing this is to cut grooves across the parts that remain and bridge the gap by inserting a piece of bone taken from the shin. The latter is shaped to fit the gutter provided for it and is tied in place. Until these mortised bones have had time to unite, the upper and lower jaws must be fastened rigidly together to prevent them from being moved. Flesh and skin are placed over the bone, the inside of the mouth built up, and artificial teeth ultimately supplied.

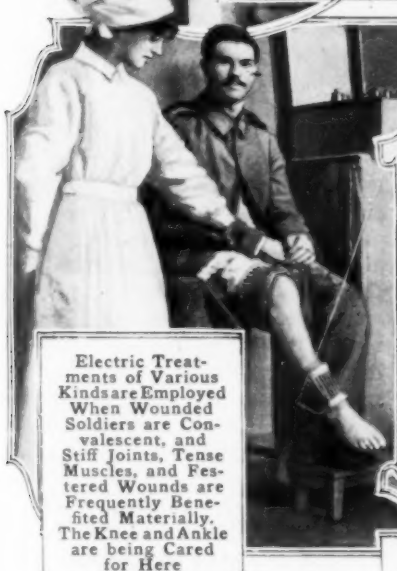
Francis Derwent Wood, the well-known sculptor, has supervision of the work that is being done in a London hospital devoted to prosthesis, or the supplying of artificial members or parts, for facial disfigurements. He and his staff devise ways of hiding the scars and gaping holes that have not, for one reason or another, been made sightly by the surgeons. When noses, cheeks, eyes, and lips are missing, he fashions a copper mask to cover exactly the disfigured portions of a face. Shields of this kind are plated with silver and then tinted so artfully that they have actual flesh color. An interesting phase of this work is that the masks are not stereotyped in form, as one might suspect. By means of photographs taken of the patient previous to his being wounded, one of these devices is made almost to duplicate the missing parts so that a man whose face is half metal may nevertheless have the same general appearance he possessed originally. Spectacles especially designed for the purpose are generally employed to hold the covering in place.

Plastic surgery is accomplishing much more for the maimed in war than is even hinted at here, but no more than other branches of surgery. The

PHOTO COPYRIGHT UNDERWOOD & UNDERWOOD

Wounded French Fighter Equipped with a Bracket Brace Designed to Hold a Fractured Arm in the Most Advantageous Position for Mending

Baths and Massage Treatments are Extensively Used in German Military Hospitals. Wounded Soldiers are Pictured Here Taking Electric Baths in One of the Berlin Hospitals



Electric Treatments of Various Kinds are Employed When Wounded Soldiers are Convalescent, and Stiff Joints, Tense Muscles, and Festered Wounds are Frequently Benefited Materially. The Knee and Ankle are being Cared for Here

PHOTO COPYRIGHT, INTERNATIONAL FILM SERVICE

Weighing a Pound and Three-Quarters, This Pressed-Paper Limb Is 10 Pounds Lighter than the Wooden One It Replaces

PHOTO COPYRIGHT UNDERWOOD & UNDERWOOD

Slings Devised in an American Hospital in France for Supporting the Shell-Mangled Arms of a Soldier Who Also is Suffering with General Paralysis, Due, No Doubt, to Severed Nerves

PHOTO COPYRIGHT MEDEM PHOTO SERVICE

Spring Harness Fitted to Frozen Hands of French Soldier. The Apparatus Also Renders Paralyzed Hands Useful

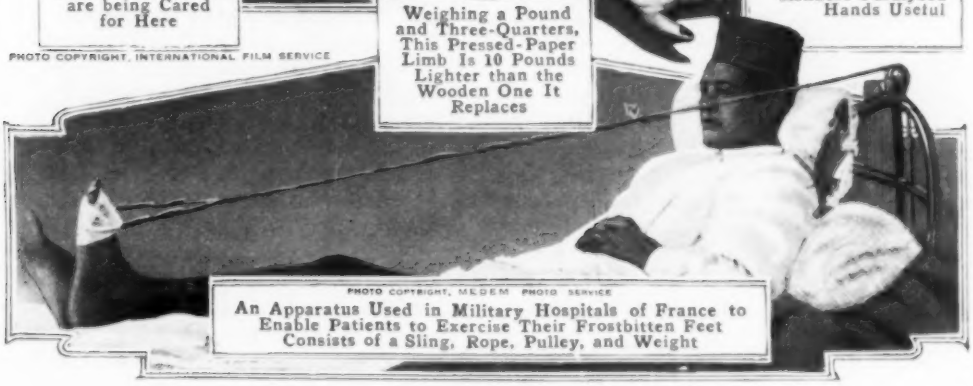


PHOTO COPYRIGHT, MEDEM PHOTO SERVICE

An Apparatus Used in Military Hospitals of France to Enable Patients to Exercise Their Frostbitten Feet Consists of a Sling, Rope, Pulley, and Weight

lives of whole armies of men are being preserved, even though parts of their bodies die. Fewer amputations, it is interesting to observe, are being made, in proportion to the number of cases brought before the surgeons, than one would dream were possible. Of some 3,000 operations performed at one of the large military hospitals in London, primary amputations have been carried out only in 25 instances. It is becoming universally recognized that a stiff, crippled limb is almost always better than any artificial apparatus that could be made to replace it. Therefore, as a general rule, amputations are now made almost exclusively for the purpose of saving life.

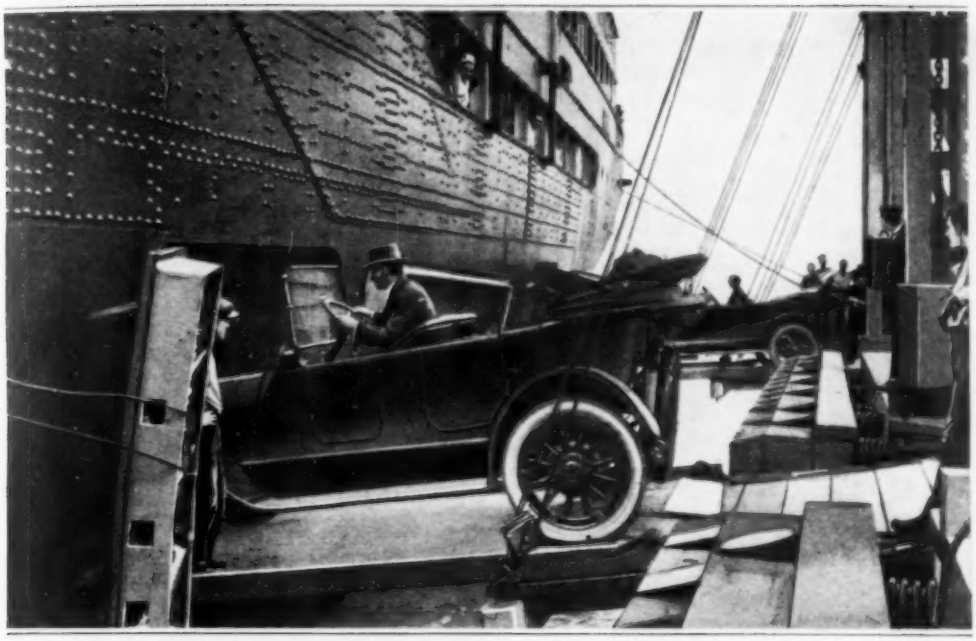
In all of the warring countries much attention is being directed to physical therapy. Massage, electric treatments, passive exercises, hydrotherapy, and mechanotherapy include some of the many systems of treatment that are being followed. Special institutions for administering to the wounded in these ways have been established, while at convalescent homes and general field and base hospitals elaborate apparatus is usually installed. Machines for exercising different parts of the body, loosening stiffened joints, and strengthening weakened muscles and limbs are employed extensively. Many of them are highly ingenious contrivances of fairly new character. Most interesting in this connection are the artificial sun baths that are being used, especially in Germany. A quartz lamp that gives off medically valuable rays is one of the recent inventions that seems to be of real importance. It is intended to flood a patient with light which is comparable to mountain sunlight, bathing the body with the rays that are ordinarily absorbed by the thick atmosphere characteristic of all cities. An electric arc producing a cold bluish light is employed in combination with lamps that radiate warmth. Extensive wounds, even of grave nature, respond quickly to the light treatment and are said to heal with surprising quickness.

One of the final steps in the reconstruction of the maimed soldiers consists in fitting artificial members to those who have lost arms, legs, or some other part of the body. Remarkable progress has been made during the past year or more and now mechanical hands and feet that function in an astonishingly lifelike way, instead of merely hiding deformities, are produced. A special hospital is operated at Roehampton where the latest devices of this kind are provided. The same arrangement obtains elsewhere, and soldiers who have given up an arm or leg while fighting are supplied with the most ingenious substitutes that inventive skill can develop. Then come the finishing touches, the final adjustment of the rebuilt soldier before he is discharged from the hospital. Engaged in this peculiar work are many resourceful men and women who strive to accomplish the little things that have either been left undone through oversight or lack of ingenuity on the part of some one.

But wonderful as is the work of the war surgeons, consider the result. A man, possibly of middle age, a machinist, a bank clerk, or a stenographer, has been rebuilt; that is, his life has been preserved and his missing parts replaced with artificial ones. His country can no longer use him, and he has given it the tools with which he formerly supported himself and possibly a family. He has not yet learned to use cleverly his new arms and legs; he has no idea how he can make a living. Shall he commit suicide, now that he is unwatched by hospital attendants, or shall he turn beggar or crook?

Two years ago these were questions which the individual might decide for himself. Not so today, however. Europe has awakened, and for the first time in history the maimed soldier is commencing to get a fair deal.

How the warring nations are obliterating the stigma that has always been cast upon cripples, and are reëducating these men so that they may fill useful and even important niches in civil life, is the absorbing topic next to be considered.



Cars are Driven into the Ship's Garage through the Gangways and Stowed for the Voyage

PACIFIC LINERS EQUIPPED WITH MOTOR-CAR GARAGES

One of the trans-Pacific steamship companies, which handles a large volume of the Hawaiian and Oriental tourist business, has fitted its liners with garages for the accommodation of motor cars owned by passengers. The compartments are so situated that ready access to them is afforded by the gangways. This permits a car to be driven directly from a dock into the hold of one of the vessels and stowed away for the voyage. Space for about 40 machines is afforded in one of these garages. The provision is more or less an innovation and has been brought about by the increasing practice among tourists to have their motors accompany them on their travels. In the past it has been a common practice to crate the machines and lower them through a hatch into a ship's hold from the deck. In addition to being an inconvenient and more expensive arrangement, the scheme occasionally proved hard on the cars, fenders being smashed and enamel marred.

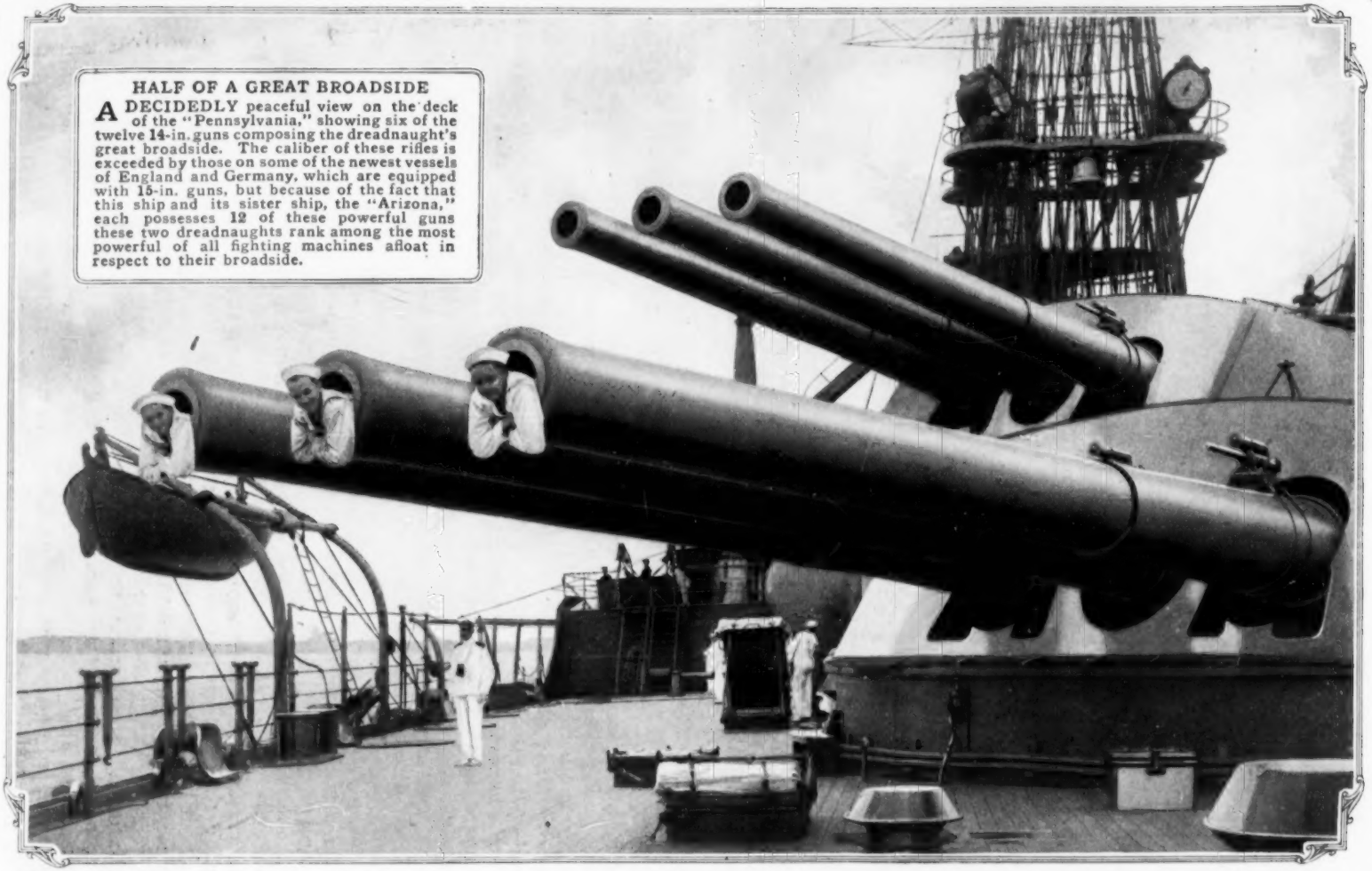
NEST MADE ON BIRD-HOUSE ROOF AND ELECTRIC WIRE

The placing of a bark-covered bird house over the entrance to a busy carpenter shop in Nashua, Ia., last summer caused a robin to build its nest in an unusual place. Instead of making its home in the shelter provided, as might have been expected, the bird chose to build just above the house, so that part of the nest rested on the little roof and part on a large electric wire which was close by. Here eggs were laid and hatched. The bird seemed undisturbed by the passers-by.

¶A captain in the United States Navy has made a proposal for the building of a 600-ft. battleship which would be semisubmersible.

HALF OF A GREAT BROADSIDE

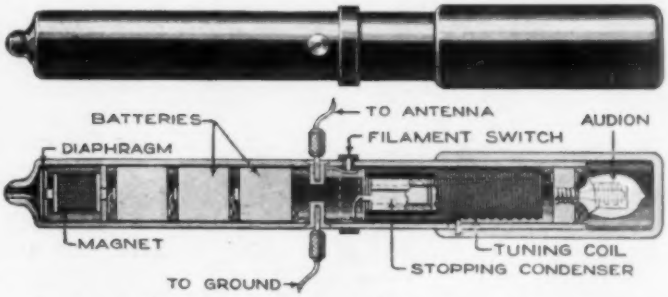
A DECIDEDLY peaceful view on the deck of the "Pennsylvania," showing six of the twelve 14-in. guns composing the dreadnaught's great broadside. The caliber of these rifles is exceeded by those on some of the newest vessels of England and Germany, which are equipped with 15-in. guns, but because of the fact that this ship and its sister ship, the "Arizona," each possesses 12 of these powerful guns these two dreadnaughts rank among the most powerful of all fighting machines afloat in respect to their broadside.



COPYRIGHT, E. MULLER, JR.

TINY WIRELESS RECEIVER IS LATE INVENTION

One of the very well-known American pioneers in radio development has lately invented a tiny wireless receiver which makes it possible for a man in the streets to pick up messages sent out from any station in the immediate vicinity. The device has the appearance of a fountain pen and is of about the size of one. Its interior arrangement is remarkably compact and ingenious. At one end are a magnetic coil and diaphragm connected with three diminutive batteries. Back of these the antenna and ground wires project through opposite sides of the tubing at the middle. Near the antenna post is a filament switch. The rear end of the casing is occupied by a stopping condenser, tuning coil, and miniature audion amplifier, upon which the success of the instrument depends. In use, the antenna wire is extended down a coat sleeve and through a cane to its ferrule. The ground wire passes down a trouser leg and is connected with a metal plate attached to the heel of one shoe. By pressing the diaphragm end of the instrument into one ear, holding the cane antenna at arm's length into the air, and standing with the heel plate against a fire plug or some other metal object which will provide a good ground, messages can be picked up without difficulty. A ring encircling the tube offers a means of adjusting the tuning coil to receive vibrations of various lengths.



Having the Size and Appearance of a Large Fountain Pen, This Is in Reality a Miniature Radio Receiver

DIKES ON NEW CONCRETE PAVEMENT SAVE WATER

The accompanying illustration shows a variation from the common practice followed in flooding a concrete pavement with water so that it will set and dry properly. The usual method is to throw up a single barrier or dike of earth around each square and then flood it with enough water to cover even the highest portion. Since the center of the pavement is usually some inches higher than the sides, this requires a good deal of water. In irrigated regions where water is scarce, the plan has been followed of making two parallel dikes near each edge of the pavement. In this way less water is needed to cover the crown of the roadway.

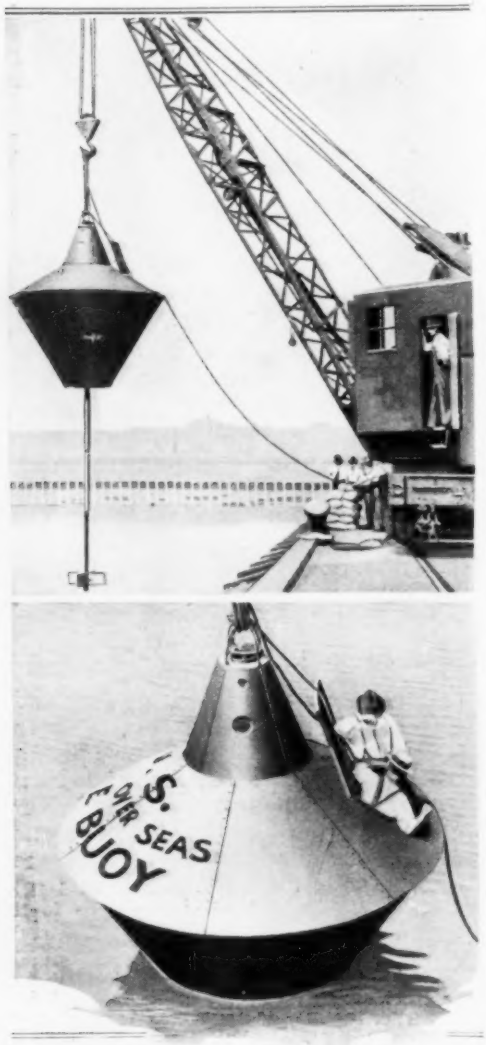
By Making Double Dikes near the Edges of This Newly Laid Concrete Pavement, Less Water was Required to Cover the Curved Surface than if a Single Dike had been Made

---

¶A stray dog in Mt. Carmel, Pa., which has assumed the task of voluntarily watching certain mail bags while the carrier is absent, has been awarded a suitably inscribed collar by the postmaster general.

BIG BUOY A SUBSTITUTE FOR LIFEBOATS

A life buoy capable of sheltering 40 persons has been on exhibition recently in the Willamette River at Portland, Ore. It is intended as a substitute for



Below: Steel Top-Shaped Buoy Which can Shelter 40 Persons and Also Enough Provisions to Supply Them Several Days. Above: View of the Life Buoy, Showing Anchor That Serves as a Ballast and Is a Means of Keeping the Buoy Upright in the Roughest Sea

a lifeboat, and its inventor claims that it is unsinkable, noncollapsible, and will ride upright in the roughest sea. The device is made entirely of steel and resembles a huge top. Entrance is gained through a trapdoor which is water-tight when closed. The buoy is intended to be kept on a vessel's deck and if in time of danger there is no opportunity to launch it, passengers need only get inside and wait for it to take the water as the boat sinks. The upper portion is fitted with windows and serves as a conning tower, where lights or other distress signals can be displayed. A storage battery supplies current for lights and for a ventilating fan that periodically expels air through a vent in the tower. The vent can be regulated by a person acting as a lookout. Circular tiers of seats are provided for the occupants. There is also space for storing water and provisions enough to last a week or ten days. The anchor consists of three heavy pipes which telescope one within the other and can be drawn up by a winch. The lower end of the anchor is filled with cement for ballast. The buoy weighs 2,000 pounds.

FLIES AVOID ROOMS WITH BLUE-GLASS WINDOWS

That flies will avoid a room which is lighted with windows of certain colors is the conclusion recently reached by two English experimenters. A room was fitted with blue-glass windows, having horizontal axes, and it was found that when they were placed obliquely so that the light inside looked blue from the outside, hardly any flies entered the room. On the other hand, when the windows were of white, yellow, or orange hue, the flies entered in large numbers and seemed at ease. The conclusion drawn from these and similar experiments was that white, yellow, and orange rays are light to the fly while the other colors, particularly blue, are dark to it. If further investigation should confirm these conclusions, it is possible that louvers of light-blue glass could be provided for workshops, stores, and even hospitals, where abundant ventilation is desirable, and so make screens unnecessary.

NEW NATIONAL PARK OPENED TO PUBLIC IN MAINE

Many Picturesque Spots are to be Found along Kurt Dedrich Climb on Dry Mountain, One of the 10 Peaks in the New Sieur de Monts National Monument Area

Above is Pictured the Park Entrance with Dry Mountain Partly Visible in the Background. Below Is a Stretch on the Beechcroft Trail Extending up Newport Mountain

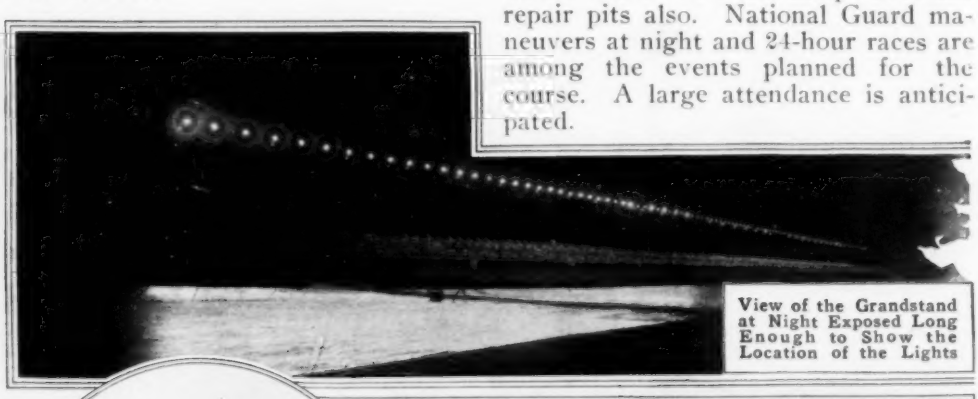
Emery Path Is Another of the Dry Mountain Trails That Leads One to Inspiring Vistas and Invigorating Atmosphere. Birch, Mountain Ash, Spruce, and Alder Trees Abound

More than 5,000 acres of land on Mount Desert Island, Maine, south of Bar Harbor, comprise the Sieur de Monts National Monument, which was created in July of last year by presidential proclamation. Ten mountains and four beautiful lakes are included in the reservation, which is not only of historical interest but also of much scenic splendor. The area forming this new national playground has been turned over to the government for the

benefit of the public by the owners, who style themselves the Hancock County Trustees of Public Reservations. The island itself was discovered and named by Samuel de Champlain in 1604 and more than 80 years later granted by Louis XIV to Sieur de la Mothe Cadillac. The plans for the development of the park area include the construction of some 300 miles of motor roads and foot trails to the summits of the mountains and to the several lakes. A biological laboratory, a botanical garden of trees, and a herbarium are to be established, an old beaver pond restocked, and other undertakings of a similar nature carried out. So far, through public subscription, several trails have been established on Dry and Newport mountains and named in memory of well-known families. The entrance to the park is within the village limits of Bar Harbor, while the borders touch Northeast Harbor, Southwest Harbor, and Seal Harbor.

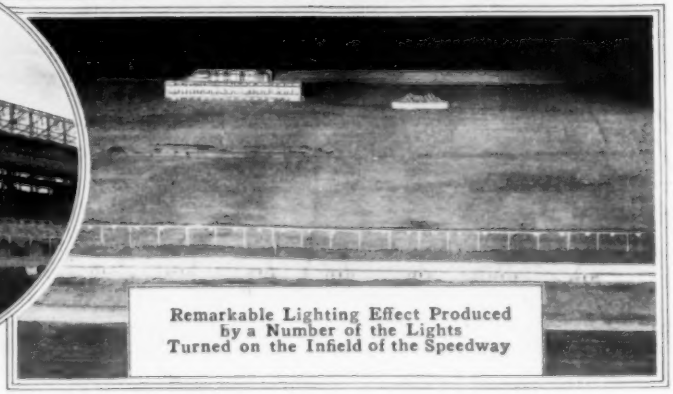
TWO-MILE SPEEDWAY TO BE ILLUMINATED AT NIGHT

The two-mile Sheepshead Bay automobile speedway, near New York City, together with its 160-acre infield, are to be artificially illuminated by 370 powerful electric lights, making it perhaps the largest area in the world lighted in this way for amusement purposes. Arrangements are being made to hold races and other events here at night. On 30-ft. poles, set around the whole of the course, will be 224 of these lamps, which are of the gas-filled type, equipped with reflectors that can be manipulated so that they will illuminate the whole field with light estimated to be 50 times as bright as moonlight, or their rays can be concentrated on the track in such a way that the racers will not see the bulbs. Extra-bright illumination will be supplied in front of the grandstand by 114 lamps, set in the upper part of that structure. There will be 32 extra lamps over the repair pits also. National Guard maneuvers at night and 24-hour races are among the events planned for the course. A large attendance is anticipated.

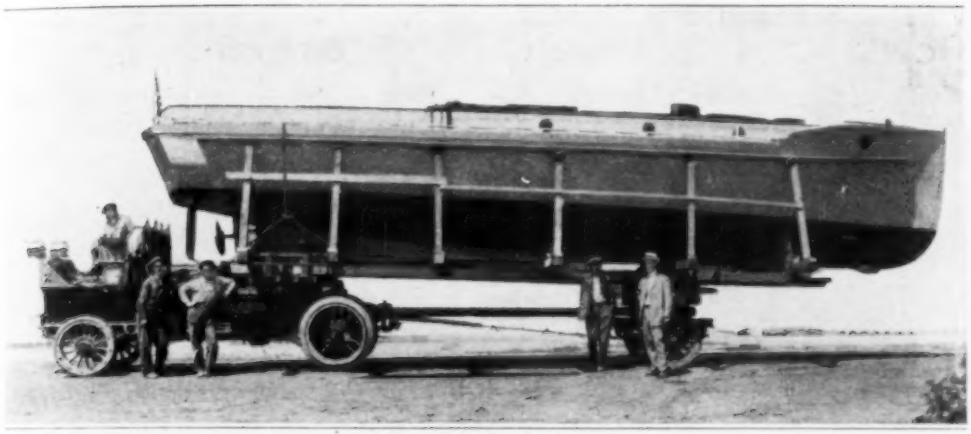


View of the Grandstand at Night Exposed Long Enough to Show the Location of the Lights

Grandstand of Sheepshead Bay Speedway in the Daytime, Showing Lights Located along Upper Bank of Seats



Remarkable Lighting Effect Produced by a Number of the Lights Turned on the Infield of the Speedway



Held Upright in a Large Cradle and Carried on a Motor-Truck Trailer, This Bulky 11-Ton Fishing Boat was Taken across Country from Los Angeles to the Ocean

MOTOR TRUCK AND TRAILER TRANSPORT HEAVY BOAT

With a motor truck and trailer the problem of transporting a 42-ft. fishing boat, weighing 11 tons, from a point near Los Angeles, where it had been constructed, overland to Long Beach, where it was to be used, was worked out satisfactorily and without difficulty. For six months the craft lay on the ways waiting for the evolution of a feasible plan of moving it to the seashore. Then a special trailer was constructed, a big cradle built to hold the vessel steadily, and the trip made without accident.

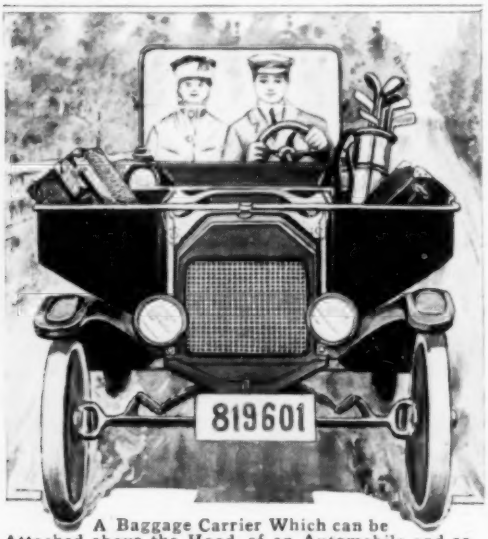
INGENIOUS METHOD USED TO ENLARGE DWELLING

A simple and ingenious method was employed by carpenters in Great Neck, N. Y., to enlarge one of the rooms in a dwelling house in that place. After laying the floor beams of the new portion of the room they sawed off the end of the wing to be altered. When it had been completely severed it was held in position by a rope which was fastened to the attic-window casement and the chimney of the attic. The rope was slowly payed out until the wall leaned about 15°. Then crowbars were used to pry the bottom along on string pieces that had been coated with soft soap, until the partition was again in a vertical position. Braces were so placed that they prevented the wall from falling back against the building. These steps were repeated until the partition had been brought out to its final position. Then the space between it and the rest of the building was inclosed.

Wing of a House Which was Enlarged by Cutting Off the End and Moving It Out on String Pieces with a Rope and Crowbars, After Which the Intervening Space was Walled In

DEVICE CARRIES BAGGAGE OVER AUTOMOBILE HOOD

One of the recently patented automobile accessories is a baggage carrier which can be attached over the hood

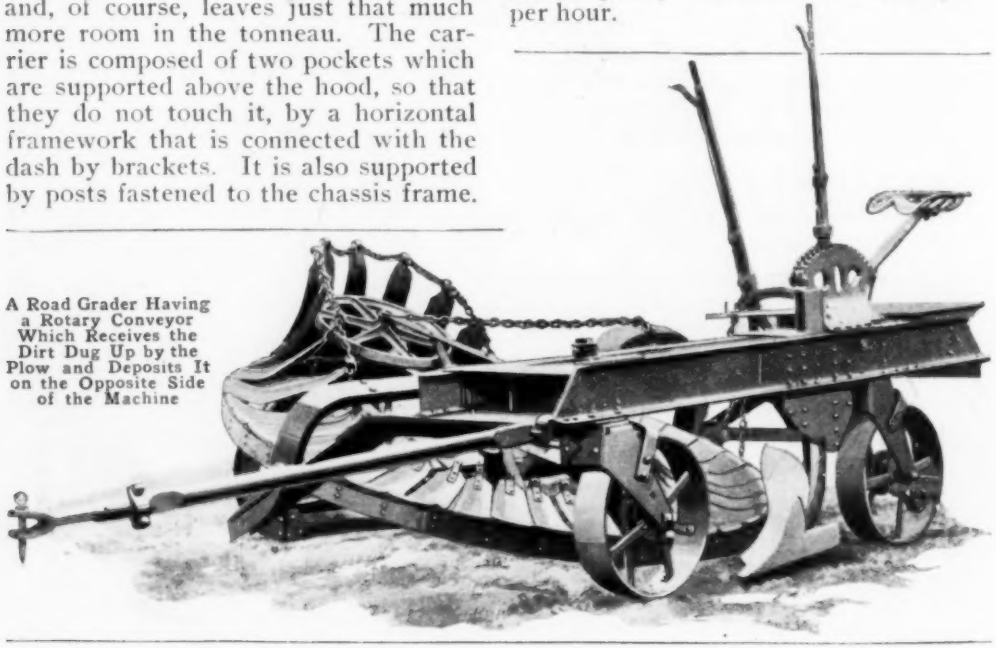


A Baggage Carrier Which can be Attached above the Hood of an Automobile and so Makes It Unnecessary to Occupy Space in the Tonneau with Suitcases or Other Luggage

of a car. It is suitable for transporting suitcases, bundles, or a camping outfit, and, of course, leaves just that much more room in the tonneau. The carrier is composed of two pockets which are supported above the hood, so that they do not touch it, by a horizontal framework that is connected with the dash by brackets. It is also supported by posts fastened to the chassis frame.

ROAD GRADER DESIGNED ON NEW LINES

New ideas in construction have been incorporated in a road grader now on the market, for which it is claimed that it does much more work than graders of the blade type. Under one side of the frame is a plow which can be raised or lowered by the driver. As the plow is drawn through the soil it discharges dirt onto a circular carrier, or platform, which lies almost level with the ground and is rotated by friction with the ground on the plow side, and by the rim of a supporting wheel on the other side. The revolving carrier is made in sections, and as the dirt is carried to the opposite side of the grader, these sections are tilted up on end and the dirt drops off onto the ground. In this way the machine can be used to round off the crown of a highway by running the plow in the ditch and depositing the dirt higher up in the center of the road. The dirt can be dropped any desired distance from the plow within a range of from 5 to 10 ft. The machine can be used for making roads up to 30 ft. in width. It has a capacity of from 200 to 300 cu. yd. per hour.



A Road Grader Having a Rotary Conveyor Which Receives the Dirt Dug Up by the Plow and Deposits It on the Opposite Side of the Machine

DARING BIRDMAN AND HIS FEATHERED FRIENDS

A MELANCHOLY interest attaches to this photograph of birds of a feather flocking together—an aeroplane and its owner at the Exposition Grounds, San Diego, Calif., surrounded by a flock of pigeons that seem to recognize the birdman as a kindred spirit. The picture was taken just before the last successful flight of Joe Boquel, a skillful but reckless airman who fell to his death on his next attempted flight at San Diego, November fourth.

WEARING AWAY OF COINS DUE TO PERSPIRATION

According to an investigation recently made by a British official the chief cause for the wearing away of coins is not the mechanical rubbing due to long-continued use, but is produced by the fatty acids contained in the perspiration, conveyed to coins by the fingers of the persons handling them. These acids slowly corrode the baser metals, particularly copper, with which the precious metal of the money pieces are alloyed. The corrosion, according to this authority, gives the coins a pitted or spongy surface which easily rubs off, exposing new portions of alloy.

BOAT LADDER FOR RESCUE OF THE DROWNING

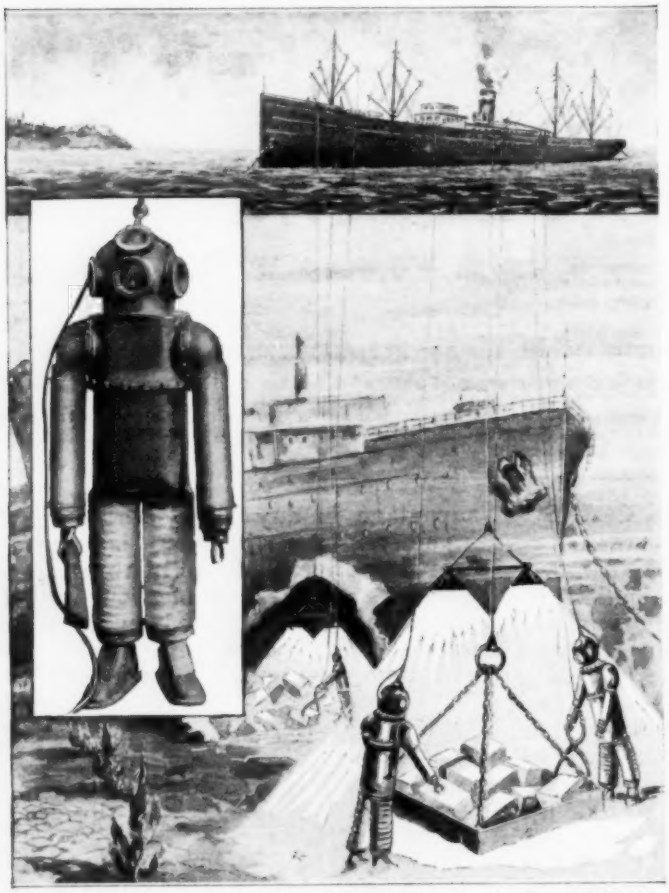
A recent German invention enables men in a boat to take a drowning person from the water without leaving their seats or otherwise disturbing the balance of the boat, this being a decided advantage in any kind of a sea. A framework resembling a ladder is floated overboard, attached to a rope. The person in danger of drowning is pulled near it and placed on it backward, floating safely until the ladder with its load is pulled into the boat by

Taking a Drowning Person from the Water with a Rescue Ladder, Easily Hoisted by Its Towline and Pulleys

means of the towline and an arrangement of small pulleys attached to the gunwale.

DIVER BREAKS RECORD IN DEEP-SEA ARMOR

A new deep-sea diving record was set recently by a resident of Toledo, Ohio, who descended to a depth of 361 ft. in Grand Traverse Bay in a newly patented diving armor of his own invention. The armor is rigid and designed especially for salvage work at great depths. Unlike the usual diving dress, it requires no air tube; an oxygen tank attached to the armor supplies the diver's needs. The helmet, body, and feet are constructed of manganese bronze, while the armored legs and arms are flexible and provision is made for grasping objects beneath the surface. A telephone apparatus in the helmet keeps the diver in constant communication with the surface. During the test in Grand Traverse Bay the inventor talked freely from the bottom with the members of his party on a steamer overhead, and stated that he suffered no inconvenience. It required only three minutes to lower him to the depth of 361 ft. and five minutes to raise him. With this armor, it is claimed, a diver can remain submerged for four hours at a time. It weighs 125 lb. and the shoes 16 pounds.



PHOTOS BY AM. PRESS ASSN.

How Divers may Work on a Submerged Wreck at Great Depths in the New Rigid Diving Armor Invented by a Toledo Man. No Air Tube is Needed, as the Diver Carries His Own Tank of Oxygen

BIG CASTINGS FOR SHIP'S STABILIZERS

Two gyroscopic stabilizers being installed in a United States Navy transport now under construction, have castings which are said to be the largest ever made for this purpose. Subjected as these parts are to very severe tests, great care had to be taken at every stage of their production. One of the castings weighed 56,000 lb. as it left the foundry. It is 10 ft. in diameter, and 27 in. thick on its face. Since it will revolve at 1,150 revolutions per minute it was necessary to make it absolutely sound. The heading was made more ample than is usual, five large heads being put on the outside rim, so that the actual metal used was nearly twice the weight of the casting. Since practically the entire surface must be machined, special care was taken to prevent blowholes or shrinkage cavities. The metal used was plain carbon open-hearth steel.

CUTTING A TWO-MILE SLICE THROUGH A CONGESTED CITY STREET

By THOMAS H. RUSSELL

THIRTY-SEVEN thousand pieces of property have been assessed to bear their share of the cost of a great street-widening project now under way in the city of Chicago as part of its plan for a "City Beautiful." These are all situated in the area to be benefited by the improvement, which is the widening of an old and important business thoroughfare, Twelfth Street, from Michigan Avenue to Ashland Avenue, a distance of over two miles. The former width of the street for the greater part of the distance was only 66 ft. between the building lines. This is being increased to 108 ft., giving a roadway 78 ft. wide and allowing 30 ft. for sidewalks. To get this width the south side of the street was selected for sacrifice, and a longitudinal slice, 42 ft. wide, is being cut through the buildings on that side for a distance of approximately a mile and a half.

The general scope of the operations along this portion of the street may perhaps better be described as shaving off the fronts of the buildings—shaving them 42 ft. deep—since this has actually been done in many cases, although a large number of buildings of solid construction have been moved back to new foundations, while others have been torn down to be rebuilt farther back, and still others have simply disappeared under the wreckers' hands. It is a district of congested "foreign" population, and in the work of dismantling the old frame buildings along the line of the improvement, the wreckers have had the cheerful assistance of thousands of women and children who swarmed over the ruins daily and gleaned full harvests of winter fuel.

At the eastern end of the street, beginning at Wabash Avenue, only a short distance from Lake Michigan, the

Children Collecting Fuel from Wrecked Twelfth Street Structures: The Little Foreigners of the District Swarm over the Ruins, but None of Them has been Injured So Far

thoroughfare is carried over scores of railroad tracks by means of a long, unsightly steel viaduct, and over the Chicago River by a bridge. This portion of the street is included in the widening project and contracts have been let for the new viaduct and bridge required, which together will be somewhat under a mile in length. Property belonging to 18 or 20 railroad companies, whose tracks are spanned by Twelfth Street, has been condemned by the city for the improvement, and while some of the companies have appealed to the Supreme Court in an effort to get more compensation, it is not likely that the law will delay the building of the new viaduct. The old Twelfth Street viaduct has been a source of danger and an eyesore to Chicago for many years. The new structure is expected to furnish a worthy approach to the great Field Museum, now under construction on the lake front at the foot of Twelfth Street.

Many great cities have cut a swath of improvement through their busy streets. London, Paris, all the world's capitals, from time to time have undertaken similar operations. But in the opinion of the engineers engaged in the Chicago project—some of whom have assisted in important city improvements in Europe, notably in the beautiful city of Budapest—the Twelfth Street widening is unique in many respects. The number of buildings successfully moved to new locations; the unusual rapidity of the work; the extent and value of the property affected, and the diversity of the building and engineering operations going on at the same time in the district under improvement, are all equally remarkable and set a record for the engineers and officials in charge. For instance, when the president of the Board of Local Improvements, under whose auspices the work is done, assumed his office in the spring of 1915, he was told that it would take at least six years to get started on the Twelfth Street widening. After only 18 months the project was half completed, and in 18 months more it will be done.

The number of separate pieces of property condemned by the city and taken over for the improvement was 301. The owners were paid at a fair rate for the buildings and grounds taken, and they were then assessed back for their due share of the cost of the improvement. There was a city bond issue of $1,750,000 to help in taking care of the property owners. The bonds were all sold at par within six weeks, and every property owner was paid for the ground he released to the city as soon as he turned it over clear of buildings and gave the city a quit-claim deed. In this way the good will and coöperation of most of the property owners were secured and the progress of the work facilitated.

When the owners were appeased the problem frequently was to get rid of the tenants, so that the buildings could be torn down, shaved off, or removed. Then there was the problem of sanitary improvements. In many of the old buildings which the owners desired to move, amazing conditions were discovered. There were buildings, 80 ft. long, with windows only in the front and the rear. With the coöperation of the Building and Health departments these conditions were remedied. Owners were compelled to put in light shafts and remodel the buildings so as to give light and air in every room. Ramshackle buildings on rear lots had to go, to make room for structures in front to be moved back on new foundations, and there was a general sanitary cleaning-up of the entire district affected by the street improvement.

The house-moving operations were so numerous as to become commonplace. In several instances a whole row of stores, wide open and flourishing, with two or three floors of domestic establishments above, all going on as usual, gradually drew back from the old street line under the pressure of the movers' jacks, until the new alinement of the street was reached, 42 ft. back. In a typical case of this kind, a three-story building containing a drug store, a grocery, and four other stores, besides the overhead population,

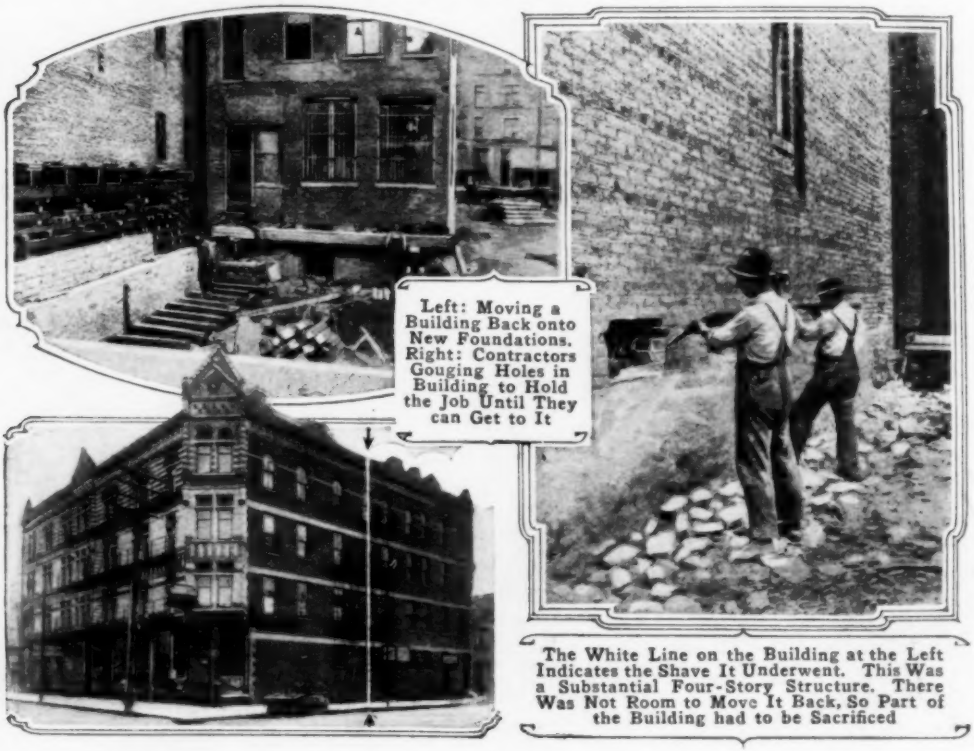
This Four-Story Block of Stores and Flats on Twelfth Street, Chicago, is Shown during the Process of Moving It Back 42 Feet to Make Room for the Widening of the Street, and the Scene Is Typical of Many Similar Operations along the Mile-and-a-Half Route of the Improvement from Ashland Avenue to the Viaduct and Bridge, Crossing Many Railroad Tracks and the Chicago River. Business was Carried On as Usual and Family Life Upstairs was Undisturbed

Here the Same Block as Above is Seen Soon After It Began Its Backward Journey to a New Site in the Rear. The Jackscrews Are in Place below the Sidewalk Level, and Interested Spectators are Watching the Workmen

At This Corner a Three-Story Block Containing a Drug Store and Several Other Retail Places, with Well-Filled Residence Apartments Overhead, was Moved Back So Skillfully That the Bottles on the Druggist's Shelves were Unshaken. In This Picture the Old and the New Widths of Twelfth Street can be Compared. The Building at the Left was Moved Back 42 Feet

the druggist declared that the bottles on his shelves were not even shaken by the moving operations. Another three-story building with cracked, thin stone-slab facings, and containing several stores, was moved to its new location without widening a crack or breaking a pane of glass. At Throop and Twelfth streets a four-story building of 240-ft. frontage, containing many stores and residence flats, all densely crowded, was moved back 42 ft., by horizontal screw jacks, in the manner shown in a photograph, while "Business as Usual" was the standing sign in the stores of the druggist, the jeweler, the hardware merchant, the laundryman, the butcher, the tailor, the printer, and the dealer in paints and oils—and none of them was in the least concerned over the safety of his family upstairs. So far no accidents have occurred during the operations, in spite of the influx of women and children to secure spoils among the wreckage.

At one point a large brick German Catholic Church, with a heavy steeple, is to be moved back the required distance of 42 ft. from the building line. Near by the synagogue of the Congregation Anshe Kalvaria has been torn down, and all the buildings condemned will soon be out of the way. There are then two miles of sidewalks to be laid, for which a concrete retaining wall is built as fast as the buildings are cleared away; also new sewers, new paving, and new street-car tracks. The total cost of the improvement will probably amount to $10,000,000, including the shares of the city, the property owners, and the street-railway company. The steam railroads contributed $800,000 toward the cost, and the largest award of damages by the city for property taken was $416,000, which was paid for a 50-ft. lot with its improvements at the corner of Twelfth Street and Michigan Avenue. But when completed Twelfth Street will be a creditable modern thoroughfare, with real-estate values enhanced and a new knowledge of the building and sanitary powers of a great city.



Left: Moving a Building Back onto New Foundations. Right: Contractors Gouging Holes in Building to Hold the Job Until They can Get to It

The White Line on the Building at the Left Indicates the Shave It Underwent. This Was a Substantial Four-Story Structure. There Was Not Room to Move It Back, So Part of the Building had to be Sacrificed

A Specially Built Asbestos Booth Housed the Projector That Flashed the Returns on Election Night in November at a Street Crossing in Down-Town Chicago. The Photograph Shows Message Which Drove the Watchers Home Fully Convinced That Mr. Hughes was Elected President

NOVEL METHOD OF SHOWING ELECTION RETURNS

On election night, when the results of the recent presidential campaign were eagerly awaited by great street crowds in Chicago, one of the operating stations from which returns and motion pictures were displayed by a newspaper was installed in a small house of asbestos board, set up on a motor truck near the intersection of Fifth Avenue and Madison Street. Electric current was secured from a near-by building and a telephone line was run into the asbestos hut to carry the returns, which were written on stereopticon slides and projected on a screen hung by a gas-pipe frame to the structure of the elevated railway.

LAMP CLEANER'S ELECTRIC CAR WITH LADDER

When a street-lamp inspector and cleaner makes his rounds in Fall River, Mass., he travels in comfort with an 8-ft. ladder pivoted upon the bonnet of his electric runabout. With this arrangement, the ladder is available for instant use, by simply swinging it upright on its swivel and leaning it against the lamp-post. As it does not rest on the ground, but on the vehicle, the operator may use it without getting down to the sidewalk or pavement, which adds to his comfort in rainy weather or when the streets are incumbered with mud or slush. Also the ladder may be 4 ft. shorter than if it were used from the level of the street.

Street-Lamp Cleaner's Outfit Used in Fall River, Massachusetts: When Not in Use the Ladder is Propped Back over the Seat of the Runabout

BANQUETERS HEAR MUSIC WITH WIRELESS PHONE

A commercial organization in New York City recently had the novel experience of being entertained by phonograph music transmitted to its banqueting room by wireless apparatus. The equipment used was similar to that described in Popular Mechanics Magazine some time ago, which has as an essential feature the audion incandescent amplifiers. Arrangements were made with a phonograph company to play a selection of records on a phonograph in its studio. In the horn of the instrument special transmitters were installed which carried the sounds to a wireless instrument, whence they were discharged into the air. On the roof of the hotel in which the banquet was being held the electrical impulses were gathered up by special receivers and carried by wires to the banquet room. By means of microphones and horns the audience was able to hear distinctly.

COPYRIGHT, UNDERWOOD & UNDERWOOD

Dr. Lee de Forest and His Wireless Telephone Apparatus Which was Used in Entertaining a Company of Banqueters Recently. With This Equipment Selections Played on a Phonograph in a Distant Studio could be Heard Distinctly

SEALING WAX USED IN DECORATIVE ART

Sealing wax and gummed paper are combined to make many pleasing forms in a new style of decorative art. The materials are easily procurable and the only utensils needed are a shaping stick and an alcohol lamp. Sealing wax can be obtained in 72 shades, and the gummed paper in many colors also. With a little practice good results can be secured, similar to those shown in the illustrations. Flowers may be imitated in sealing wax and are a favorite form of this decoration. The paper is made into a variety of shapes and decorated with sealing wax, or a shape of pasteboard or other material—for instance, a box—may be taken as the groundwork for ornamentation with both paper and sealing wax of various hues. Articles made and decorated in this way make welcome gifts.

Top View: Compote Dish and Candlestick of Paper Rope, Finished and Decorated with Sealing Wax. Lower View: Pasteboard Boxes and Flowerpot Decorated with Black Gummed Paper and Sealing-Wax Flowers

FIGHTING SHIP "ARIZONA" IS IN COMMISSION

New United States Dreadnaught "Arizona" Passing down East River from the New York Navy Yard on Its First Voyage into the Atlantic. The Ship Is One of the Most Formidable War Vessels Afloat and has Been in Commission Only a Few Weeks. It was Launched in June, 1915, and Christened with a Bottle of Water—the First to Flow through the Spillway of the Roosevelt Dam. The "Arizona" Is 608 Feet in Length and Mounts Twelve 14-Inch Rifles. Insert Shows One of Its Bombproof Fighting Tops, an Innovation for Which the Offensive Use of Air Craft in Modern Naval Engagements Is Responsible

COPYRIGHT, AM. PRESS ASSN.

IMPROVED PULSATOR FOR MILKING COWS

In an improved milking machine the pulsator is a simple three-movement vacuum pump which milks two teats

One Man can Milk 18 to 30 Cows an Hour with This Double-Unit Milking Machine, Which is Operated by a Vacuum Pump

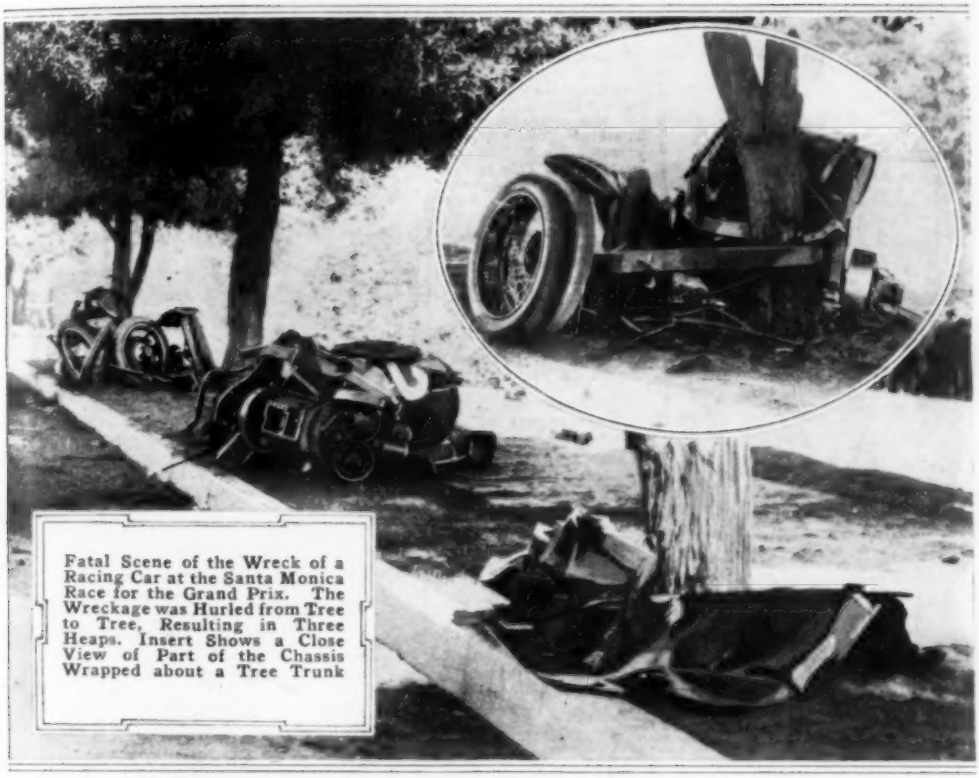
at each stroke of the piston, instead of milking four at once, then running back empty. This gives the pulsator an even-running motion and puts much less strain on the cow. The complete installation of this milker comprises the single-cylinder vacuum pump, a small storage tank, and a single ¾-in. pipe, which can be run to any part of the cattle barn. Newly designed teat cups are used, of one size for all cows. They have a pure-rubber lining and are so constructed that the teat is massaged perfectly at each stroke of the pulsator, thus eliminating the possibility of congestion.

HUGE TABERNACLE BUILT FOR A REVIVAL

When Billy Sunday, the sensational evangelist, opened his great Boston revival November 12, to continue for three months, a force of 2,000 well-drilled ushers was required to seat the people in this great structure of brick and wood, erected for the revival campaign by its supporters. It is the largest temporary building ever constructed for religious worship, and outside of the great cathedrals the largest house of worship ever built, at least in modern times. It has seats for a congregation of 13,100 persons and also 2,500 seats for the great choir, the largest body of singers brought together in Boston since the days of the

COPYRIGHT, BOSTON PHOTO NEWS CO.

This Immense Building of Brick and Wood, Seating More than 13,000 Persons, is Filled Daily with the Crowds Attracted to Billy Sunday's Revival Meetings in Boston, and Is the Largest Tabernacle Ever Built



Fatal Scene of the Wreck of a Racing Car at the Santa Monica Race for the Grand Prix. The Wreckage was Hurled from Tree to Tree, Resulting in Three Heaps. Insert Shows a Close View of Part of the Chassis Wrapped about a Tree Trunk

great Peace Jubilee. There is nothing ornate about the building, which has plain brick walls and a wooden roof covered with roofing paper. A specially constructed sounding board, or "augophone," in six pieces resembling half horns, is placed directly over the pulpit. There is standing room for 2,000 to 3,000 more people.

RACING CAR WRECKED AT SANTA MONICA

Leaving the track on the thirteenth lap of the Grand Prix automobile race at Santa Monica, Calif., November 18, a car driven by Lewis Jackson pursued a most erratic course for a few moments that proved fatal to the driver and three others. The car was traveling at a speed of over 100 miles an hour when it swerved from the road at a slight turn, broke through two trees, one almost 18 in. in diameter, and a lemonade stand, and then wound itself around a third tree, where the driver was killed. The motor and radiator were hurled some distance farther, to another tree, striking and killing a spectator. A moving-picture camera man was killed by the fall of the second tree, and the proprietor of the lemonade stand, a woman, was hurled 100 ft. to her death. The mechanician seated by Jackson was thrown clear of the wreck and escaped with minor injuries, but two other spectators were severely injured. A few minutes before the accident the driver broke a wheel, which was replaced in great haste.

¶ The longest stretch over which commercial wireless messages have ever been sent extends from Hawaii to Tokyo, a distance of 3,355 miles. Wireless communication was established between the United States and Japan November 15, via this route, when the president sent greetings to the Japanese emperor.

SMART, DASHING MODES IN GOWNS, BOOTS,

For the Street, the Opera, as a Negligee in the Morning or a Tea Gown in the Afternoon, a Dainty Creation for the Springtime, a Tasteful Costume for Winter, Each Pattern Distinctive, This Is the New Gown, Instantly Convertible for Any Occasion at Any Hour, Two Views of Which are Shown at the Left and Below. Tight Sleeves or Loose Ones, a Train or a Short Skirt, may be Had for the Wishing. It Is Available in Materials as Exquisite as the Gown Is Surprising

COPYRIGHT, 1916, BY THE DE WELLS CO.

Military Styles Continue in Millinery: This Tasteful Hat, Inspired by the Steel Casque, Has a Crown Covered with Heavy Tin Foil and Surmounted by a Bow of Silver Braid. The Brim Is Blue Velvet; the Trimming a New Cloth Resembling Fur

COPYRIGHT, UNDERWOOD & UNDERWOOD

COPYRIGHT, UNDERWOOD & UNDERWOOD

Here Are Quite the Correct Togs for the Girl Who Skates. They Embody Comfort and Just Dash Enough to Be Attractive but Not Conspicuous. The Shoes Lace on Two Sides so That They Fit the Foot Snugly at All Points

The Styles in Boots Are a Bit Extreme Unless One Shows Discrimination in the Gowns Worn with Them. The Walking Shoe Above with Striped Top and Heel can be Had in Different Colors to Suit One's Street Costumes. The Opera Boot, of White and Gold Brocade, Is of Exquisite Richness, and with Certain Types of Evening Gowns—and Small Feet—Adds a Refining Touch to a Beautiful Outfit

AND HATS FOR THE GIRL OF THE MINUTE

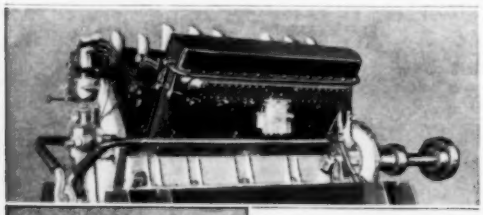
Smart Turban, Neckpiece, and Muff Suitable for the Dressy Young Matron Who Demands Distinctive Apparel. Incidentally the Turban Is More than It Appears to Be. There Are Two Pockets in It for Coins and Tickets and a Separate Place for Concealing the Indispensable Powder Puff

This Attractive Coat Is Not Merely Stylish and Comfortable, but Convertible Besides. It is Made of Brown Cheviot Velour, is Lined with Velvet, and can be Worn Inside Out. Furthermore, When There Is a Flurry of Snow in the Air, the Broad, Soft Collar can be Turned Up over the Head to Form a Snug, Warm Hood. The Heavy Cuffs Serve as an Improvised Muff When Needed. Because of the Different Ways the Garment may be Worn, It Easily Takes the Place of Two, or Even Three, Ordinary Coats, and Fits In Splendidly for Various Informal Occasions

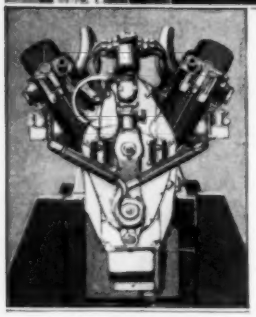
High Lace Boots with Puttee Effect, Which Gives Them a Distinctly Military Appearance. Primarily Intended for Motoring but Equally Suited for Walking and Driving, They Are Available in Neutral Gray and Vici Kid. The Heels Are of Comfortable but Not Extreme Height

LARGE AERONAUTIC MOTOR FORMALLY TESTED

An aeroplane motor of 300 hp., probably one of the largest in the world, was given its first formal test recently in the laboratory of a motor company at Springfield, Mass., whose chief engineer is the designer of the new motor. It was built in response to the demand for an aeronautic motor for the use of the U. S. Navy in its aerial craft, and represents a year's work on the part of the designer. Complete with electric starting, ignition, and lighting apparatus, tachometer to show propeller speeds, exhaust pipes, and provision for wireless-telegraph power, the motor weighs 1,400 lb. In the formal test it was run for a period of eight hours and exhibited its rated horsepower during the last hour. This power will turn a four-bladed propeller, 14 ft. in diameter, at the rate of 1,100 to 1,200 revolutions per minute.



Aeronautic Motor of Unusual Size and Power, Designed for the Use of the Navy and to Drive the Largest Aeroplanes at High Speed



Another View of the Motor Which Recently Developed 300 Horsepower and may Be What Our Naval Airmen are Waiting For

WARSHIPS' ICE PLANTS A SOURCE OF DANGER

Experience in the present war has confirmed the belief of certain English engineers that a commander of a fighting ship is taking a grave risk if he goes into action with the vessel's refrigerating plant charged with either carbon dioxide or ammonia. If the former system is the one installed, and if the plant is charged, injury to the boat may result in the asphyxiation of the members of the crew below decks. Equally disastrous results would follow if an ammonia system developed a serious leak during action. In the United States Navy the ammonia system is used on colliers and nonfighting vessels. On the battleships dense-air and carbon-dioxide refrigerating plants are employed, while on some of the destroyers and gunboats the systems installed are of the sulphur-dioxide type.

HOOD SUPPLEMENTS SPIKES ON NOSE DEVICE FOR COWS

The habit which some cows have of milking themselves as well as other cows has resulted in the invention of many devices to prevent this practice. The one shown in the accompanying illustration has, in addition to the commonly used rowel, or row of sharp spikes, a sort of hood or protector which fits down over the nose in such a way that it makes it most difficult for an animal to practice its bad habit, even if it is willing to endure the pricking of the spikes. The device is fastened to an ordinary halter.

A Device to Prevent a Cow from Milking Itself, Which Has, in Addition to a Row of Spikes, a Hood That Partly Covers the Nose

TWO FATAL RAIL ACCIDENTS OCCUR IN EAST

COPYRIGHT, UNDERWOOD & UNDERWOOD

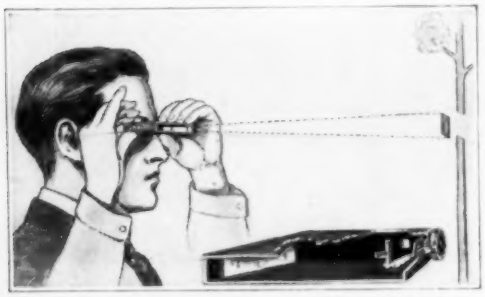
Forty or More Persons were Drowned When a Trolley Car Plunged through an Open Drawbridge into Fort Point Channel at Boston Recently. The Motorman, Conductor, and Several Passengers Standing on Platforms Leaped from the Car and Survived. In Less than 12 Hours the Car, Shown Here, was Recovered from the Water Only Slightly Damaged

Near South Station Terminal, Scene of Boston Tramway Tragedy. The Motorman Claims Signal Lights were Not Showing and He Had No Warning of Open Span

Herewith is Shown Part of What Remained After 60 Heavy Freight Cars Broke Loose at the Top of a Steep Incline near Altoona, Pennsylvania, and Crashed into Four Big Locomotives Standing on the Tracks Below. The Accident, Which Occurred November 6, the Day before the Boston Disaster, Resulted in the Death of 10 Persons and the Serious Injury of a Score of Others

GAUGE FOR DISTANCES IN PHOTOGRAPHY

An instrument for quickly and accurately measuring distances of objects to be photographed is in the form of a small rectangular metal box containing two mirrors, one of which is placed at a fixed angle while the other moves on an axis operated by a knurled screw which contains the distance gauge and a pointer. In using the instrument the photographer looks through a small square opening in the back at the object to be photographed. Two images are seen—first, the object itself, and second, a reflection in the smaller mirror of a portion of the object. These two images do not coincide until the pointer indicates the exact distance of the object from the instrument, which is called a telegauge. The method of its use is shown in the picture.

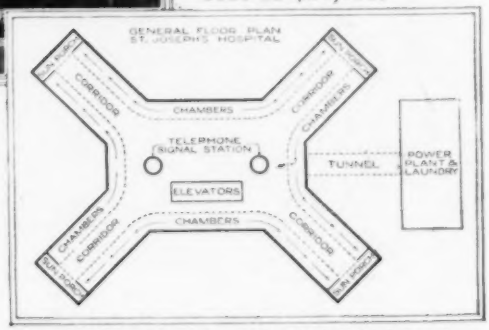


When the Two Images Seen Coincide, a Pointer in the Thumbscrew Indicates the Distance

LARGE HOSPITAL BUILDING ON A NOVEL PLAN

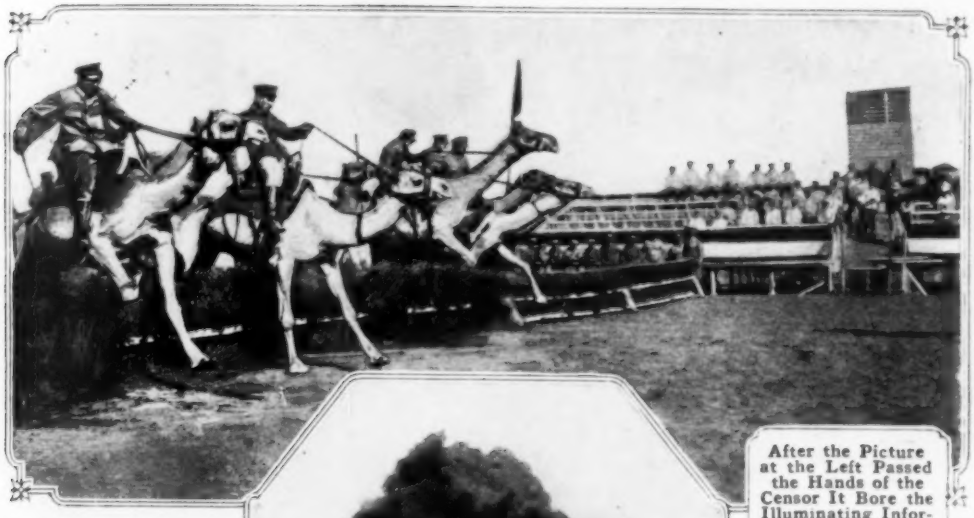
The new seven-story building of St. Joseph's Hospital, at Kansas City, Mo., now nearing completion, has been erected from novel and interesting plans. It occupies an entire city block and has been designed with a view to furnishing an abundance of light and ventilation for every room. The floor plan—which is the same on all floors—has been likened to a calfskin stretched out, and also to a four-pointed star. From a rectangular central portion, or body of the building, four oblong wings extend to the four corners of the block, each terminating in a wide and roomy sun porch. The entrances and general offices are in the center of the hospital, on the ground floor. All stairways and elevators are also in the central part. There are diet kitchens on each floor and five operating rooms on the top floor. All patients' chambers are outside rooms. The construction is of steel and reinforced concrete, with face-brick, tile, cut-stone, and terra-cotta trimming, and a gravel roof. The building cost $500,000 and is connected by a tunnel with a power plant and laundry erected separately at a cost of $50,000.

Star-Shaped Building of St. Joseph's Hospital, Kansas City, Missouri, in Which Every Patient's Chamber Is an Outside Room with Telephone and Electric-Light Signals to a Central Station on Each Floor



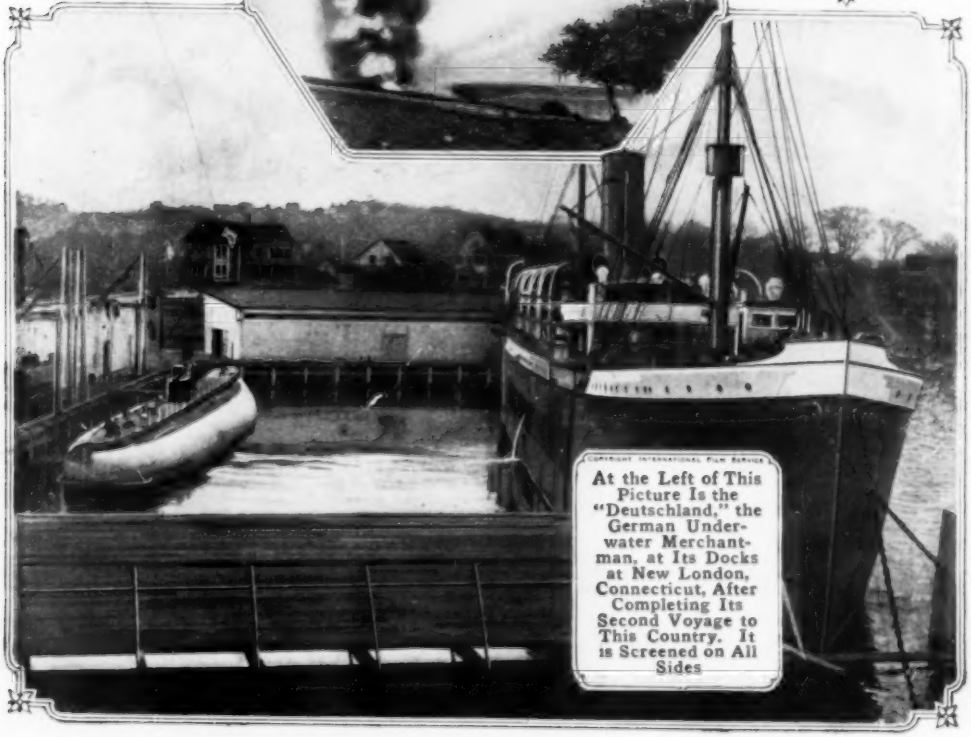
General Floor Plan of the Hospital, Which has been Compared to an Outstretched Calfskin

GERMAN PHASES OF WAR TREATED PICTORIALLY

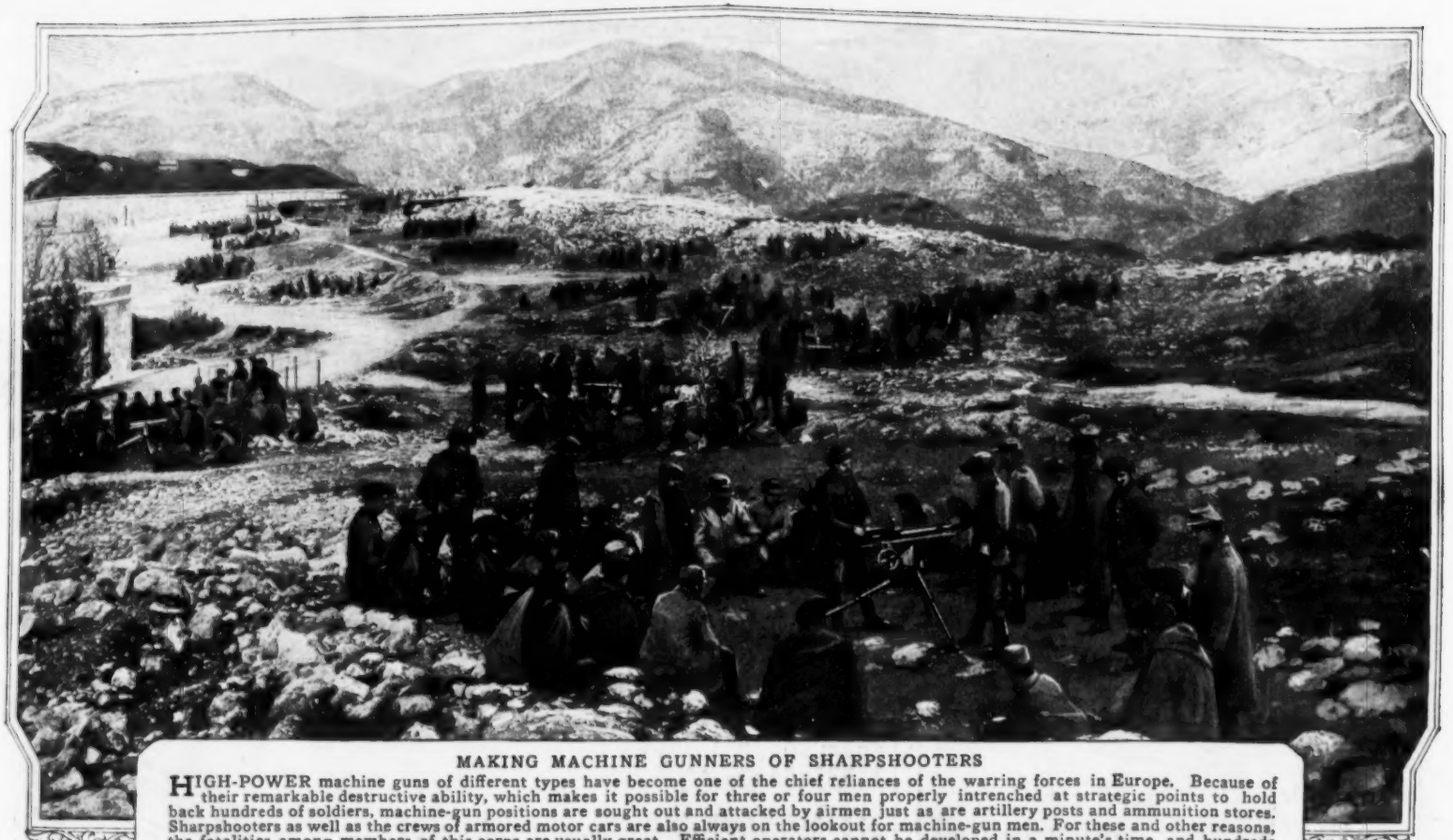


While the Russians have Used Camels on the Snow Fields of Transcaucasia, and the British have Depended upon Them in Egypt and Elsewhere, the Germans have Employed Them in East Africa. Above, German Soldiers are Competing in a Hurdle Race

After the Picture at the Left Passed the Hands of the Censor It Bore the Illuminating Information: "Explosion of Ammunition Depot of Germans." Even the Conventional "Somewhere in France," or Somewhere in Something Else, Was Missing. Nevertheless the Picture Tells an Interesting Story



At the Left of This Picture Is the "Deutschland," the German Underwater Merchantman, at Its Docks at New London, Connecticut, After Completing Its Second Voyage to This Country. It is Screened on All Sides



MAKING MACHINE GUNNERS OF SHARPSHOOTERS

HIGH-POWER machine guns of different types have become one of the chief reliances of the warring forces in Europe. Because of their remarkable destructive ability, which makes it possible for three or four men properly intrenched at strategic points to hold back hundreds of soldiers, machine-gun positions are sought out and attacked by airmen just as are artillery posts and ammunition stores. Sharpshooters as well as the crews of armored motor cars are also always on the lookout for machine-gun men. For these and other reasons, the fatalities among members of this corps are usually great. Efficient operators cannot be developed in a minute's time, and hundreds of men are therefore being trained continually to take the places of those who fall. The accompanying photograph gives one an idea of how this is done. The picture was taken on the French front and shows some 15 or more groups of sharpshooters gathered about as many machine guns to receive instructions regarding the mechanism, care, and use of these important instruments.

STRIKING SCENES WITHIN THE FRENCH LINES

COPYRIGHT, INTERNATIONAL FILM SERVICE

Some Idea of the Vast Number of Horses Employed by the Warring Armies is Afforded by This Picture, Which Shows Some of Those Attached to a French Force Operating in the Western Theater. The Animals are being Watered by Their Attendants

France, along the Line of the Western Battle Front, Is Now a Network of Light Railways. This Is an Interesting Double-Track Cable Line in the Vosges

In a French First-Line Trench on the Somme Front: While His Comrades Stand at Attention, a Soldier is Decorated

War's Scrap Heap: The Skeletons of French and German Soldiers Who Fell on "No Man's Land" during the Months of Fighting That Preceded the French Offensive along the Aisne. Until the Germans Fell Back and the French Came into Possession of the Ground, the Fighting Was Too Severe for the Bodies to be Cleared Away. This Shows Remains About to be Buried

IN FIELD AND CAMP WITH BRITISH "TOMMIES"

Lacking Facilities for Combating a Fire Which Raged in a British Camp at Saloniki, the Soldiers Saved Much from Destruction by Quickly Loading Supplies onto Trains and Conveying Them to Another Point

Covered with Heavy Woven-Wire Fabric, This Ambulance, Used by the British in the Western Theater, Is Proof against Shrapnel

CROWN COPYRIGHT RESERVED

"Tommies" Advancing to Erect Entanglements in Front of Newly Won Trenches. The Rods with Spiral Ends can be Screwed into the Ground Quickly to Form Supports

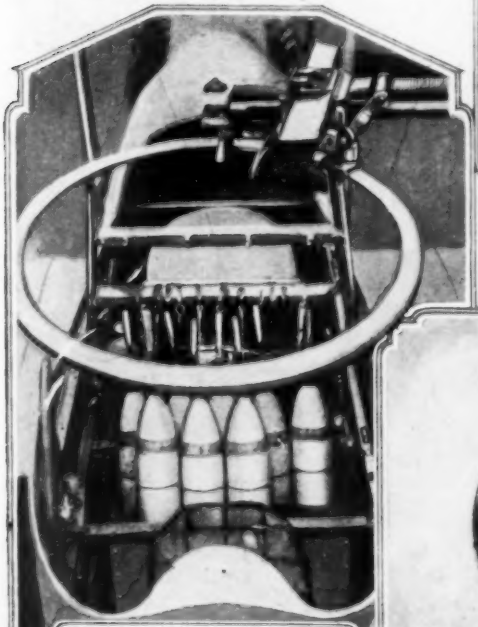
This Picture Affords One a Glimpse of the British Supply Base Maintained at Sheik Said for the Troops Operating in Mesopotamia. Rations for Both Fighters and Animals, Sufficient for Several Weeks, and Stores of Ammunition and Equipment, Are at Hand. Supply Trains Go Forth to the Front Daily from Here

ODD SIDE LIGHTS ON AERIAL WARFARE

COPYRIGHT, CENTRAL NEWS PHOTO SERVICE

Funeral of an Ill-Fated Zeppelin's Crew in England: The Bodies of the Enemy Airmen are being Carried with Military Honors to a Cemetery near London. The Men were Killed When Their Craft was Felled during an Attack Somewhere on the English Coast

Prussian Eagle Stabbed by Staffs of Allies' Flags, a Large Design Worked with Colored Pebbles and Sea Shells on the Ground at Saloniki by French Soldiers. It Bears the Legend: "Wait!! We will Pluck You Yet"

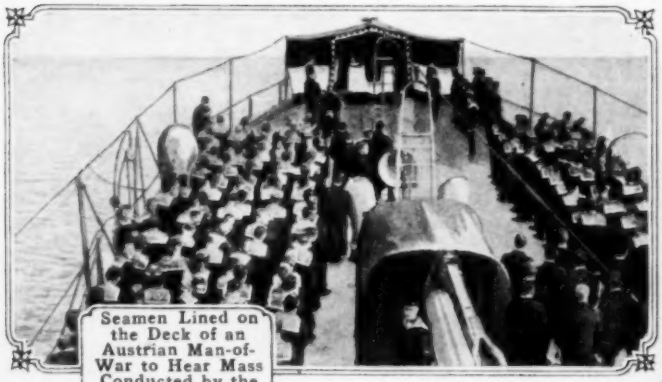


COPYRIGHT, UNDERWOOD & UNDERWOOD

Cockpit of a French Military Aeroplane, Showing Store of Bombs Ready for Launching, and Novel Mounting of Machine Gun. The Latter is Held on a Revolving Ring so That It may be Fired in Any Direction

Some of the Belgian Aerial Scouts Have Their Machines Decorated with Amusing Figures Which Serve as Mascots. One of the Painted Caricatures Is That of "Monsieur Brownie," Camera in Hand

UNUSUAL ASPECTS OF AUSTRO-ITALIAN CONFLICT



Seamen Lined on the Deck of an Austrian Man-of-War to Hear Mass Conducted by the Ship's Chaplain. This Photograph was Brought to America from Germany by the Under-Sea Merchantman "Deutschland"

The Barbarism of "Civilized" Warfare is Partly Illustrated by These Bludgeons, Said to have been Used by Austrians in the Battle of Gorizia

Italians Covering a Pontoon Bridge with Grasses in Order to Make It Resemble the Shore Line to Enemy Aerial Scouts. When Needed for Use the Floating Structure can be Swung across the Stream, to Connect the Opposite Banks, in Short Order

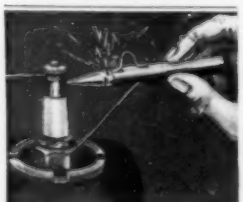
Explosion of an Austrian Shell near the Parapet of an Italian First-Line Trench in the Alps: It will be Noticed That the Soldiers are Crouching Close to the Ground, Seeking Protection from the Raining Fragments of the Bursting Projectile. Their Rifles Are in Place along the Upper Part of the Parapet

ALUMINUM PROPELLERS FOR AEROPLANES

In view of the fact that American airmen with the expeditionary force in Mexico have had much trouble with wooden propellers because of the intense heat in the region in which they have been operating, an effort is now being made to provide metal propellers. One advantage which they possess is that they will not splinter. A prominent aeroplane company in the East has received for experimental purposes a two-blade propeller made of solid aluminum alloy, which is said to be lighter than wood. Other types which are to be tested by the same concern are sheet-steel propellers, a wooden propeller with metal-sprayed tips, one covered with celluloid, and one of solid celluloid.

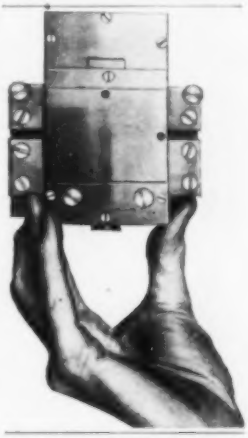
SPARK-PLUG TESTER THAT WORKS NO INJURY TO CAR

The testing of a spark plug on an automobile with such a tool as a screwdriver may subject the secondary windings and condensers of the ignition circuit to too heavy a strain. For this reason a simple tester has been devised which will not do such damage. It consists of a round piece of wood, about three inches long, to one end of which is attached a brass cone, or cap. A brass wire passes through the wood from side to side and projects off toward the cone end at an angle. The other end of the wire is looped up like a "U," and terminates close to the base of the cap. In testing, the brass cone is placed against the terminal of a plug and the wire is placed against the base. Sparking takes place between the cone and the "U"-end of the wire. Too wide a spark-plug gap will be indicated by a heavy spark, and too narrow a gap by a small spark.



UNDERGROUND RADIO PHONE OF POCKET SIZE

Although only little information concerning it is so far available, considerable importance has been attached to the development, by one of America's established inventors, of a remarkably compact, portable, wireless subterranean telephone. It is understood that the instrument has been produced as a result of the attempts of its designer to devise a wireless-signal system for fire protection in the national forests. While thus engaged he is said to have discovered a new principle of transmission. It is stated that its application is very broad, making possible telephonic communication even between ships at sea and moving trains. The outfit is apparently of the utmost simplicity, consisting, in its present form, of an ordinary transmitter, a battery, and a small instrument representing the secret of the invention. The equipment is small enough to be carried in a coat pocket and when in use is connected with a ground wire.



COPYRIGHT, UNDERWOOD & UNDERWOOD

WRITER USES MOTORCYCLE AND "WHEEL" ON TRIPS

There are few vocations off the stage which make the simultaneous use of a motorcycle and bicycle expedient, but there is a certain Californian who frequently finds it advisable to carry a light cycle with him while riding a motor-driven one. The man devotes his attention to writing articles on motorcycling and bicycling, and often relies upon the speed and range of the one to carry him to and from places where the other is to be used. A typi-

cal example of this is afforded by a recent trip made from Alhambra, where the man resides, to the seashore, a distance of about 25 miles. He

For Getting to and from His Bicycling Fields, This Man Employs a Motorcycle, Carrying a Light "Wheel" Slung over One Shoulder

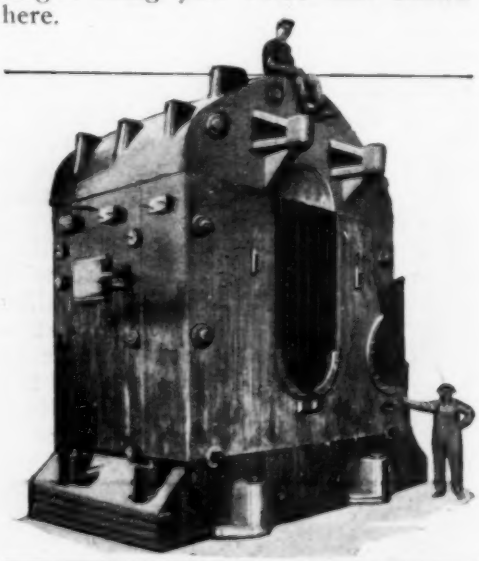
wished to gather material for a story of a day spent bicycling in some of the beach towns. So he hung a "wheel" over one shoulder, mounted his motorcycle, and chugged away to the ocean. Arriving at the beach, he abandoned the big machine until evening and spent the day on the bicycle. Without the motorcycle, most of the time would have been consumed in making the jumps to and from the seashore. With it, however, the round trip was a matter of only about an hour, and plenty of time was left for the real purpose of the expedition.

I-BEAM TROLLEY WHICH IS DETACHABLE

An I-beam trolley which is detachable has been designed for use on tracks that have no open end, so that it can be quickly removed and placed elsewhere when occasion demands. It is provided with four flanged wheels, two of which ride on either side of the beam. These two pairs of wheels are joined together by arms which extend downward and are hinged to each other at a point directly beneath the beam. A pin holds the two in a rigid position in relation to one another, so that the trolley cannot be taken from the track, except by removing the pin. This allows the two pairs of wheels, together with the arms, to be spread apart and disengaged from the I-beam.

PATTERN FOR MAMMOTH PINION HOUSING

Four skilled patternmakers in Youngstown, Ohio, were recently engaged for nearly four months in making one of the largest patterns ever constructed in that section of the country. This huge model is for a pinion housing and is almost as large as a four-room cottage, since it measures 16 by 18 by 20 ft. Nearly 8,000 ft. of lumber was used in building it. The pattern is to be used in connection with the construction of a mammoth bar mill that is to be built for a steel company in Japan. The accompanying illustration shows only half of the pattern, its length being just twice that shown here.



Portion of a Pattern for a Huge Pinion Housing Which It Took Four Men Nearly Four Months to Construct

The Small Pump, Intended for Private Garages, is Shown in Use at the Left, While the Big One, Mounted on a Steel Carriage, is Illustrated Below

ELECTRIC PUMP DELIVERS OIL-FREE AIR TO TIRES

Designed in sizes suitable for both public and private garages, an electric tire pump of very compact and convenient form has been developed. Its parts consist of a universal motor, an air compressor, a gear box, and a condensing chamber, assembled within a single housing and cooled without water. A capillary lubricating system is employed and this, it is claimed, prevents the possibility of oil-bearing vapor being driven into tires. The apparatus may be connected with any 110-volt circuit, and is light enough in weight to be lifted from one place to another in a garage without trouble. The small pump of this type, intended especially for private use, is easily carried even by a woman. The other, when desired, is supplied with a light steel carriage, fitted with a tool tray, and may be wheeled from car to car in a large garage. Both pumps are fitted with gauges and will inflate tires to 150-lb. pressure quickly, and at low cost.

¶What is declared to be the largest radio-telegraph station in the Pacific is nearing completion in Hawaii. It will be able to communicate with Manila, San Francisco, and distant South Pacific points.

BELT-SLIPPING PREVENTED BY CORK-INSET PULLEYS

The slipping of heavily laden belts on their pulleys is a source of constant loss both in power and output in manufacturing plants. To overcome this waste a Philadelphia company now makes steel pulleys in which there are a number of cork insets that serve greatly to reduce slipping. The corks are set in staggered rows and are firmly fastened in the steel by a patented method which does not add to the weight of the pulley. The insets are practically unaffected by dust, oil, or water and are said to wear almost indefinitely. Tests show that a steel pulley with cork insets has much less belt slip than one without the insets.

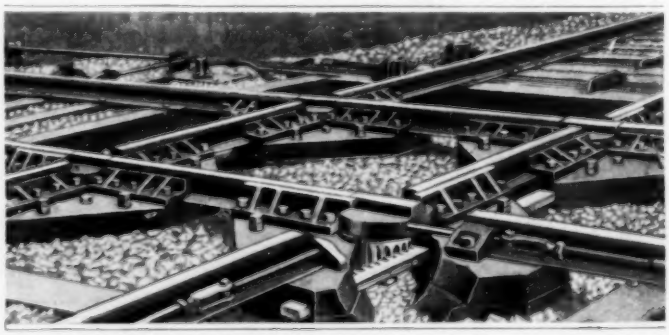
LIGHTING EQUIPMENT FOR NIGHT FLIERS

To lessen the dangers of flying by night and enable landings to be made safely after dark, a special lighting equipment has been designed for aeroplanes and hydroplanes. In the illustration the outfit is shown attached to a Curtiss flying boat. It consists of a bank of three streamlined searchlights, with parabolic reflectors which project the light beams to a useful distance. Current is obtained from a generator of 150-watt capacity, conveniently mounted and driven by means of an air turbine, at 4,000 revolutions per minute. The lights are mounted on a special fitting which secures them to either the upper or the lower plane, at its leading edge. With this fitting the lights can be tilted in a vertical plane, making it possible to use them for signaling purposes as well as in making landings. They are controlled by a push switch of special design, placed within easy reach of the pilot. The switch is normally held open by a spring, which in signaling is operated like a telegraph key, while by giving the top a quarter turn it locks in a closed position when desired.

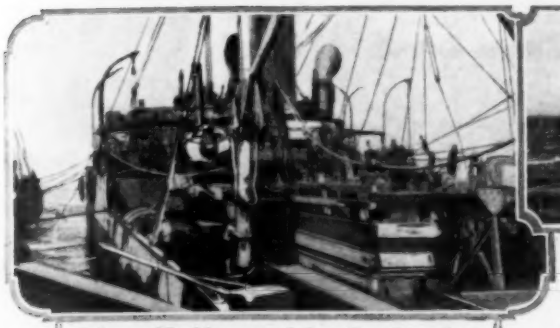
Curtiss Flying Boat Equipped with Special Lighting Outfit for Night Flying, Including a Bank of Three Searchlights on the Leading Edge of the Upper Plane, with an Air Turbine to Drive the Generator

IMPROVED RAILROAD CROSSING

Recognizing the fact that ordinary railroad-track intersections are a source of much severe wear on rolling stock and are repeatedly in need of costly repair, a firm in Clinton, Ill., has constructed a crossing for railroads which is designed on a new principle. At each of the four intersections, which exist where one track crosses another, is placed a rail only a few inches long, which is mounted on what might be

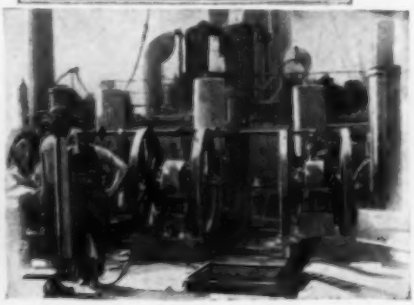


Railroad Crossing Having Four Short Rails at the Intersections, Which are Used to Make Either of the Two Tracks Continuous. The Cost of Operation and Maintenance Is Small



Salvage Machinery and Supplies Placed on the Wreck of the Naval Collier "Hector" Which Foundered off Charleston, S. C., during a Hurricane

Storm Waves, Washing over the Wreck, Repeatedly Spoiled the Work of the Salvors and Drove Them Away



Trying to Raise the Wreck of the "Hector": At the Left, a Navy Tug Standing by the Wrecking Barges. At the Right, a Battery of Air Compressors Installed on the Wreck to Clear the Holds of Water

called a miniature turntable. These four short rails are all controlled by a single lever in the interlocking tower near by. When a track is to be set for "clear," these four rails are swung around so that they make a continuous track for the route which is to be traversed. When the other track is to be used a movement of the lever swings the four short rails around so that the second line is ready for traffic. Each of the four short rails is turned by a rack which meshes with cogs in the side of its base. When they are set, each rail is locked by a simple device which keeps it in perfect alinement. The jar which this crossing produces and the cost of maintaining it are said to be much less than those of ordinary crossings.

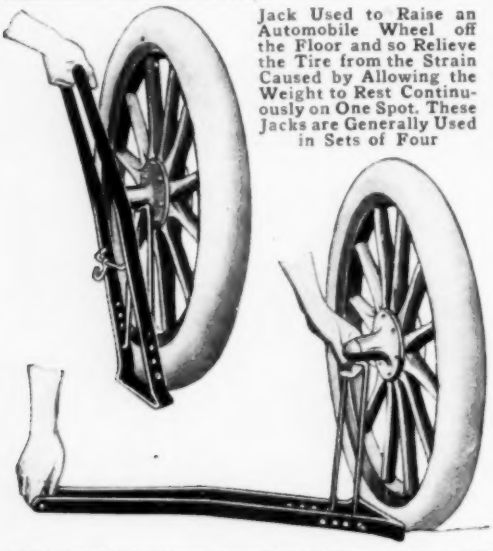
¶An automobile transportation company operating 13 passenger and freight cars, is building up a profitable business between points not more than 20 miles distant from an important Indiana city, despite competition from two steam railways and an interurban line.

SALVAGE OPERATIONS ON U. S. COLLIER "HECTOR"

After salvage operations had been carried on for two months at the scene of the wreck of the United States naval collier "Hector," which sank in 33 ft. of water off Charleston, S. C., and broke completely in two during a hurricane last July, attempts to raise the vessel were postponed until next spring. Two wrecking companies combined their efforts at salvage, but the severe storms which swept the Atlantic rendered futile their efforts to float the great hull. Cofferdams and hatch covers were built several times in attempts to pump out the holds in the stern portion of the vessel, but the work was destroyed each time a storm arose and the lives of the men were endangered. Three large wrecking barges were employed in the operations and air compressors, run by crude oil, were installed on the deck of the wreck to force air into the holds and drive the water out. These efforts will be renewed after the winter season.

JACKS TO RELIEVE STRAIN ON AUTOMOBILE TIRES

A simple automobile jack has been devised to keep cars raised off the floor while standing in the garage, and thereby relieve the tires of the strain which comes from allowing the weight to rest on one point for several hours or days at a time. The jack consists of a rectangular iron frame, 28 in. long and 9 in. wide at the base, to which an adjustable arm is pivotally attached near the lower end. To raise a wheel the jack is laid down on the floor with its base against the outer face of the wheel and the arm in a vertical position so that its free end is under the hub. By raising the end of the frame which is farthest from the wheel, the jack will act as a lever and lift the wheel off the floor. The weight will serve to keep the support steady, and tight against the wheel. These jacks are sold in sets of four. Not only do they prevent strain on tire fabric, while a machine is mounted on them, but they keep the tires out of the oil which is apt to accumulate on a garage floor. Each jack is provided with a hook to lock it in an upright position.



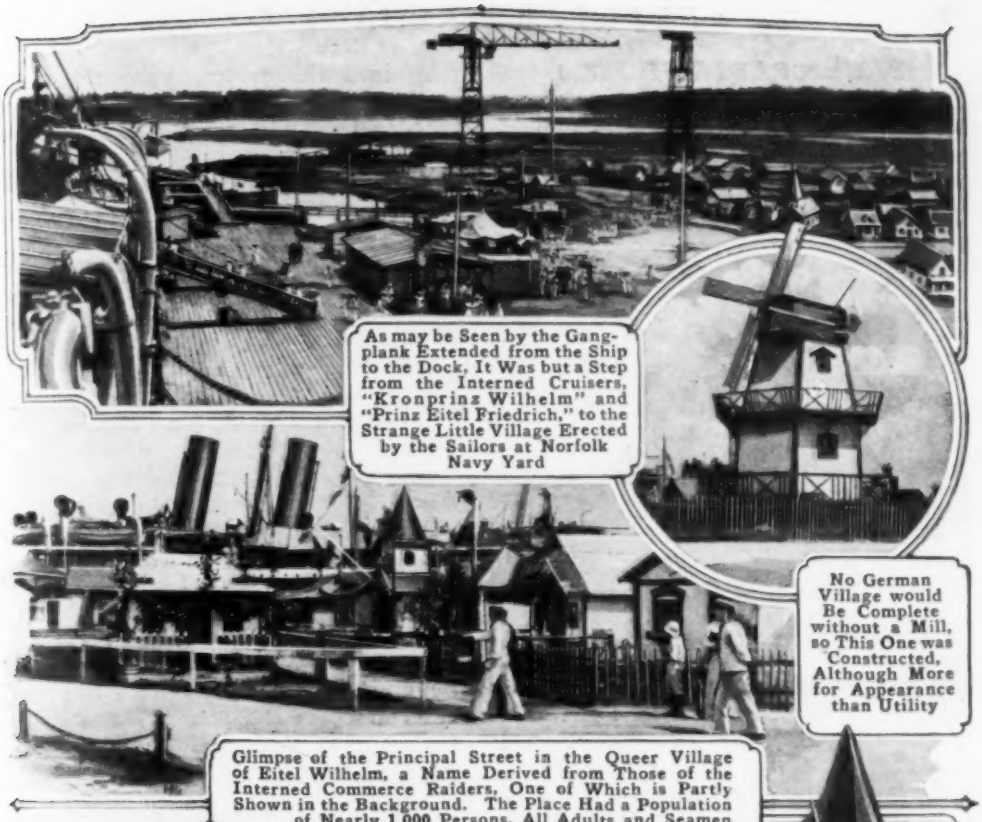
Jack Used to Raise an Automobile Wheel off the Floor and so Relieve the Tire from the Strain Caused by Allowing the Weight to Rest Continuously on One Spot. These Jacks are Generally Used in Sets of Four

PASSING OF GERMAN VILLAGE AT NORFOLK NAVY YARD

Until some few weeks ago, when the converted Teutonic cruisers, "Kronprinz Wilhelm" and "Prinz Eitel Friedrich," were transferred to Philadelphia, a German village of unusual interest flourished within the confines of the Norfolk, Va., Navy Yard where the two vessels and their crews were interned. It was called Eitel Wilhelm and had a population consisting of about 1,000 seamen. Its destruction came with the removal of the cruisers to the Philadelphia Navy Yard.

Eitel Wilhelm was built on land allotted to the sailors as an exercise ground, and out of waste materials thrown out from the shipyards to be burned. For weeks the men devoted practically all of their spare time to the erection of the quaint little place, which was scrupulously neat, distinctly German, and gay with paint of all colors. Surrounding each house there was a picket fence bordering a small, trim lawn. Adjacent to nearly every dwelling was a vegetable garden, while about the porches were vines and shrubs. Also there were chicken runs, dovecotes, rabbit hutches, kennels, and bird houses. Nor were the buildings in the village limited to dwellings. An odd little church was situated on one street and a big windmill on another. Also there were a telegraph office, mayor's office, police station, and a marriage-license bureau. The principal streets were Prinz Eitel Weg, Jungfernstieg, Kronprinz Weg, and Kleiner Kiel. It is probable that the village will be reconstructed at the Philadelphia yard.

¶A large hardware firm has added an out-of-the-ordinary feature to its catalog by placing at the bottom of each page some literary quotation or a statement of scientific or historic interest.



As may be Seen by the Gangplank Extended from the Ship to the Dock, It Was but a Step from the Interned Cruisers, "Kronprinz Wilhelm" and "Prinz Eitel Friedrich," to the Strange Little Village Erected by the Sailors at Norfolk Navy Yard

No German Village would Be Complete without a Mill, so This One was Constructed, Although More for Appearance than Utility

Glimpse of the Principal Street in the Queer Village of Eitel Wilhelm, a Name Derived from Those of the Interned Commerce Raiders, One of Which is Partly Shown in the Background. The Place Had a Population of Nearly 1,000 Persons, All Adults and Seamen

This Flagpole was Erected Supposedly for Drying the Ships' Bunting. The Bunting was Usually "Dried" on Occasions of German Victories Abroad

A Fire Station was Not Needed Because of the Proximity of the Ships, but There Were a Police Station, a Marriage-License Bureau, and the Quaint Church Shown Above

In the Middle of the Plaza Was an Open Stand Where Concerts by the Ships' Bands were Held in the Evenings. This Picture Gives One a Fair View of the Village

SAND CRABS UTILIZED FOR CHICKEN FEED

Sand crabs which swarm the beaches of California are caught by the owner of a large chicken ranch and converted by a simple process into nutritious food for his fowls. Having conceived the idea that the little crabs would make good food, he caught a few and fed them to his chickens as an experiment. Then, finding the experiment a success, he built a crab trap, resembling a large dustpan with a wire-screen bottom. With this it is only necessary to wade into the surf on a beach at low tide and drop the crab trap into the water, with the open end toward the shore. As each wave recedes from the beach and the crabs are carried along with it, the water and sand pass through the netting of the trap, but the crabs are caught. A peck or more of them are often landed at a dip. At the ranch they are boiled for 20 minutes, then spread on screens to dry, and afterward ground up to about the consistency of coarse cornmeal and further dried in the sun for 48 hours. The finished product looks very much like red sand. Fowls are said to fatten quickly on it and to lay well when fed on the crab food exclusively. The raw material costs the ranchman nothing.

Catching Sand Crabs for Chicken Feed, by Means of a Trap Resembling a Dustpan with Wire Bottom Which Removes Them from the Surf

SALVAGE OLD RAILS WITH FLANGED-WHEEL AUTOS

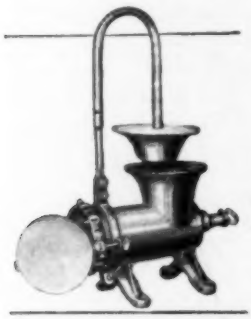
An interesting example of the profitable use on a railway line of an automobile equipped with flanged rims is to be found in Montana. The recent increase in the price of steel made it worth while for a transcontinental railway to salvage an abandoned branch which had been built to connect with a once prosperous lumber region. The forestry regulations forbade the use of any but oil-burning locomotives in this district, whereas the engines avail-

Two Views of Automobile Truck, Equipped for Track Service and Attached to a Trailer: The Outfit was Used to Salvage the Rails on an Abandoned Railway Line and Traveled 108 Miles a Day, Its Loads Being 12 Tons Each

able for the work of moving the old rails were of the wood-burning type. The contract for transporting the metal portion of the track to the main lines was finally let to a local transfer company. This concern equipped a two-ton automobile truck with flanged steel tires and installed it on the unused track. A small flat car was used as a trailer. The outfit made an average of 108 miles, or two round trips, a day, climbing several grades as steep as seven per cent. The loads averaged 12 tons each. In the first month the truck covered 3,300 miles.

COVERS KEEP DUST FROM MEAT GRINDER

An attachment has been devised for a meat grinder which protects it from dust and flies when it is not in use. The device is intended especially for grinders in butcher shops that are operated many times a day. It consists of a hinged cover which closes over the perforated end of the machine and a cap shaped to fit tightly down into the bowl, or hopper. Both parts are attached to a ring which clamps about the body of the machine. The cap over the bowl is supported by a long curved arm having a sliding joint which permits the cap to be raised or lowered and makes it useful in pressing the meat down into the hopper, as well as in covering the opening.



SHALLOW-DRAFT BOAT FOR USE IN MARSHY REGION

In constructing a subway and cable system from Brooklyn to Hammels, Long Island, across the swampy land in the vicinity of Flatlands and Barren Island, a telephone company found itself greatly in need of a power barge which would carry a heavy load but would draw very little water. To meet this requirement a craft was constructed having a tunnel chamber in its otherwise flat bottom. In the recess the propeller was placed so that it projected some distance above the water level. When the boat is carrying a 6,000-lb. load of telephone cables, or other material, it draws but 15 in. of water and so can easily navigate in the shallow waters in the vicinity of the construction work.

A Boat Having a Propeller Located in a Tunnel Chamber: When Carrying a Load of 6,000 Pounds It Draws But 15 Inches of Water

COPY OF FAMOUS STATUE ERECTED AT NEWARK

In commemoration of its two hundred and fiftieth anniversary, a splendid copy of Verrocchio's equestrian statue of the Venetian general Bartolomeo Colleoni has been presented to the city of Newark, N. J., and erected in Clifton Park. The bronze figures of horse and armored rider, 20 ft. in height, surmount a 25-ft. marble pedestal. Even the cracks, stains, and other marks on the original statue, which stands in the Campo SS. Giovanni e Paolo at Venice, have been reproduced. Colleoni was an Italian soldier of fortune who fought at different times for Venice and Milan, as well as for himself. At the time of his death in 1475 he left a considerable fund of money to the Venetians for

the Turkish war with the understanding that an equestrian statue of himself be erected. Critics have pronounced the work one of the finest of its kind in the world. The copy lately presented to Newark was produced at a cost of about $70,000, it is understood.

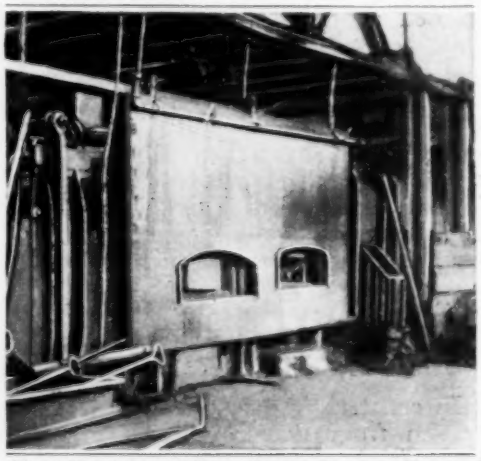
Copy of Verrocchio's Renowned Equestrian Statue Erected in Clifton Park at Newark, New Jersey, to Commemorate the City's Two Hundred and Fiftieth Anniversary

ELECTRIC SIGN PRESENTS POLITICAL DEBATE

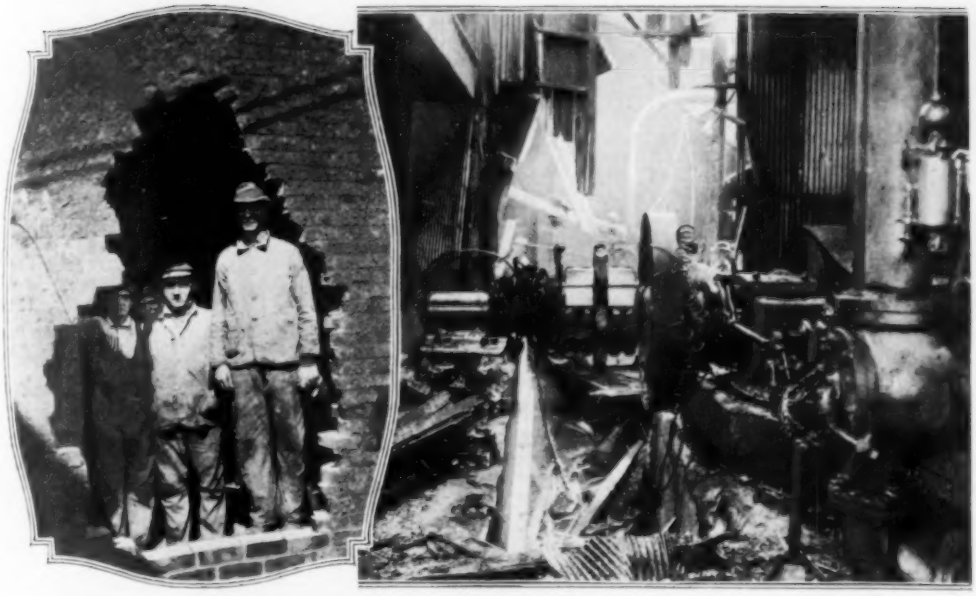
Without question electric signs played a more prominent part in the recent presidential campaign than in any previous one. A variety of electric displays bearing political messages were used in New York, Chicago, Louisville, and elsewhere, but the one in Indianapolis probably proved the most effective. The other signs were used for some one party, this one for three causes in turn. A feature of the electric board was a motograph section that permitted a display of 45 words which would move across the face of the sign in brilliant electric letters. The lighting company operating it arranged with three prominent Indiana authors to furnish copy of a political nature for this sign. Each was allowed to state his argument in not more than 45 words. A message favoring the democrats appeared one week, a message for the republicans another week, and one for woman's suffrage a third week.

WATER CURTAIN SHIELDS MILL MEN FROM HEAT

Decreased discomfort for workers in a rolling mill and hence increased production have been obtained by using what is called a water curtain to shield the men from the intense heat of the furnaces. The device is intended for use in summer and consists of a large rectangular piece of sheet metal suspended in front of the furnaces by means of door hangers that run on a track. Two openings are cut in the metal sheet to correspond to the furnace doors. Extending along the upper edge of the curtain is a perforated pipe from which a thin sheet of water flows down the outside of the metal curtain and into a trough at the bottom. The water is diverted to either side of the openings by angle irons fastened to their upper edges. The device serves to reduce the heat materially in front of the furnaces. In the winter it can be lifted from the track and stored.



Sheet-Metal Shield Hung from a Track in Front of a Furnace: Down the Front of the Curtain Flows a Thin Sheet of Water to Protect the Workmen from the Intense Heat



The View on the Left Shows a Big Hole Broken in a Brick Wall by a Section of the Shattered Flywheel. On the Right Is the Interior of the Engine Room after the Accident. The Shaft Which Drove the 30-Ton Wheel is Shown Wound with Wire

BREAKING OF FLYWHEEL WRECKS ENGINE ROOM

An accident to the governor of an engine in a Newport, Ky., rolling mill recently released the machinery from proper control and as a result the 30-ton flywheel was shattered into many pieces and the interior of the engine room was instantly reduced to a mass of wreckage. One man was seriously injured and the damage done was estimated at $25,000. Portions of the great wheel were hurled through the brick wall of the building, one of them making an opening almost large enough for an automobile to drive through. Another section landed in a vacant lot a fifth of a mile away.

CANVAS WINDBREAKS FOR SAN FRANCISCO'S TREES

In spite of the fact that the high winds of early summer have dwarfed many trees and shrubs in exposed places in San Francisco, the park authorities of that city are determined not to be defeated in their efforts at tree planting. Consequently they have erected huge windshields on the ocean side of trees in the principal parkways so that they can take strong root and develop normally. Special attention has been given to oaks and lindens. On the Presidio Parkway, for instance, every tree is sheltered on its windward side. These windbreaks

Shields Erected on the Ocean Side of Exposed Trees in San Francisco to Protect Them from Strong Winds That Prevail at Certain Seasons

consist of burlap or canvas, stretched on large wooden frames set in the ground and securely braced.

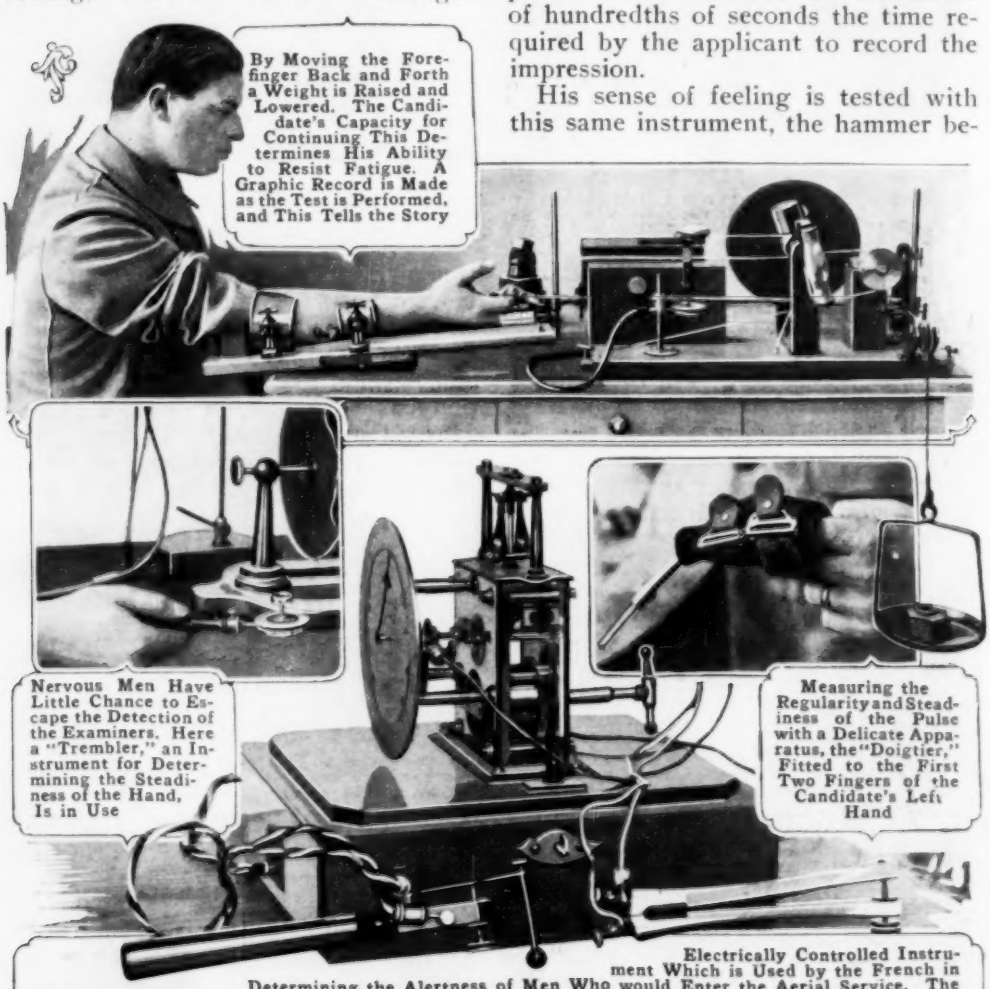
¶The Department of Agriculture finds that only 209 rods of untrimmed hedge waste an acre of land, whereas for the same expenditure of land one can run 473 rods of barbed-wire fence.

WOULD-BE FRENCH AIRMEN TESTED SCIENTIFICALLY

INSTEAD of limiting the examination of applicants for the aerial service in France to the customary medical tests required in the army and navy, a far-reaching probe of a highly scientific character is made to determine the actual fitness of candidates for this particular type of work. The result is that men who are potentially unsuited for the exacting, strenuous duties of the military flier are eliminated.

Special instruments which determine the acuteness of sight, hearing, feeling, as well as the nerve strength and ability to resist fatigue, are used. One of these is the chronoscope, which has a dial divided into 100 units and an indicator hand that makes one revolution a second. The examiner holds a small electromagnetic hammer which sets the device in motion when struck against a small metal box. The subject holds two curved strips of metal which, when pressed together, arrest the instrument. Upon hearing the impact of the hammer, the candidate stops the indicator hand in the way explained. The dial then shows in terms of hundredths of seconds the time required by the applicant to record the impression.

His sense of feeling is tested with this same instrument, the hammer be-

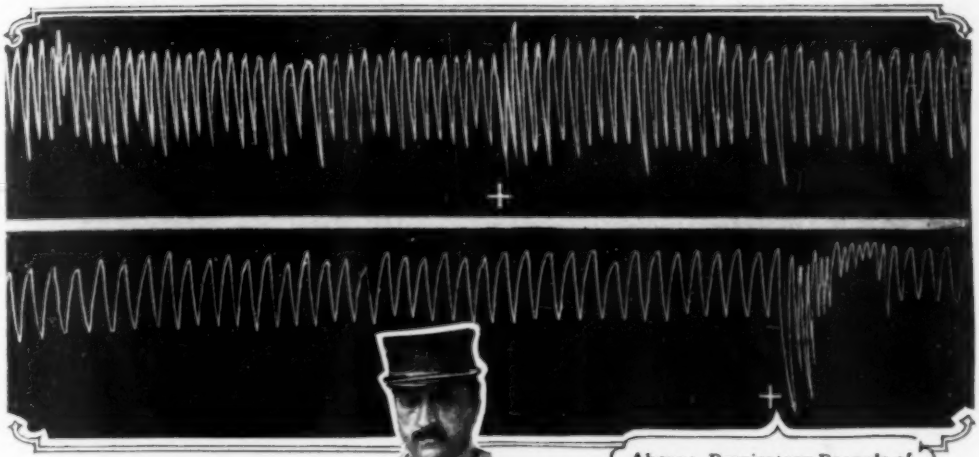


By Moving the Forefinger Back and Forth a Weight is Raised and Lowered. The Candidate's Capacity for Continuing This Determines His Ability to Resist Fatigue. A Graphic Record is Made as the Test is Performed, and This Tells the Story

Nervous Men Have Little Chance to Escape the Detection of the Examiners. Here a "Trembler," an Instrument for Determining the Steadiness of the Hand, Is in Use

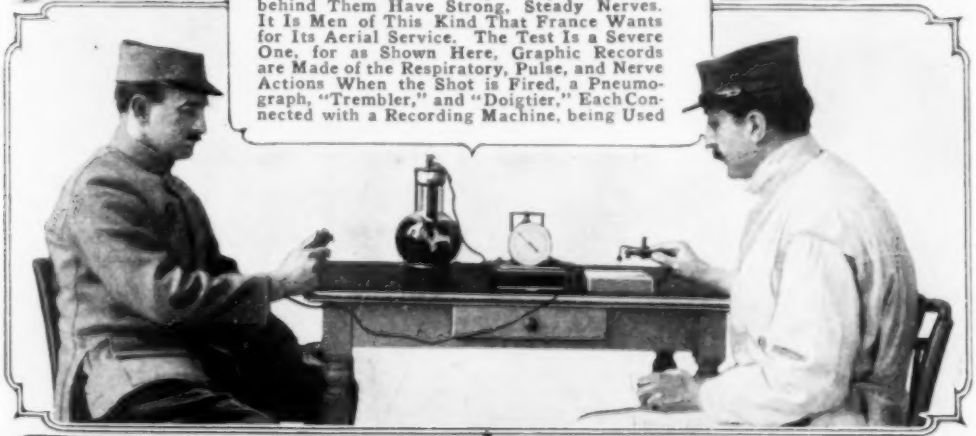
Measuring the Regularity and Steadiness of the Pulse with a Delicate Apparatus, the "Doigtier," Fitted to the First Two Fingers of the Candidate's Left Hand

Electrically Controlled Instrument Which is Used by the French in Determining the Alertness of Men Who would Enter the Aerial Service. The Apparatus Measures the Quickness of One's Hearing, Sight, and Sense of Touch. The Examining Physician Employs the Hammerlike Device Pictured at the Left, While the Candidate Operates the Elongated Switch Shown at the Right. The Contrivance is Known as a Chronoscope



Above: Respiratory Records of Two Men Who Took Test Explained Below. The First Is Good, the Second, Bad. At the Crosses are Indicated the Effects the Shots Had on the Men's Nerves. The First Man Barely Flinched; the Second, Who Normally Breathes More Slowly, but with Less Regularity, was Greatly Startled and Spent Several Seconds in Regaining His Poise, as Shown by the Short, Uneven Lines

Men Who can Maintain Complete Composure When a Revolver is Unexpectedly Discharged behind Them Have Strong, Steady Nerves. It Is Men of This Kind That France Wants for Its Aerial Service. The Test Is a Severe One, for as Shown Here, Graphic Records are Made of the Respiratory, Pulse, and Nerve Actions When the Shot is Fired, a Pneumograph, "Trembler," and "Doigtier," Each Connected with a Recording Machine, being Used



Quickness of Hearing Is an Important Attribute of an Airman. Here a Candidate is being Tested with a Chronoscope. As the Physician Taps a Metal Box with His "Hammer," the Indicator Hand on the Split-Second Dial Begins Moving. The Instant the Subject Hears the Sound He Presses the Switch, Which He Holds in One Hand, and Stops the Timer. The Dial Then Shows at a Glance, in Terms of Hundredths of a Second, How Soon the Man Responded to the Sound

PHOTOS BY JACQUES BOYER

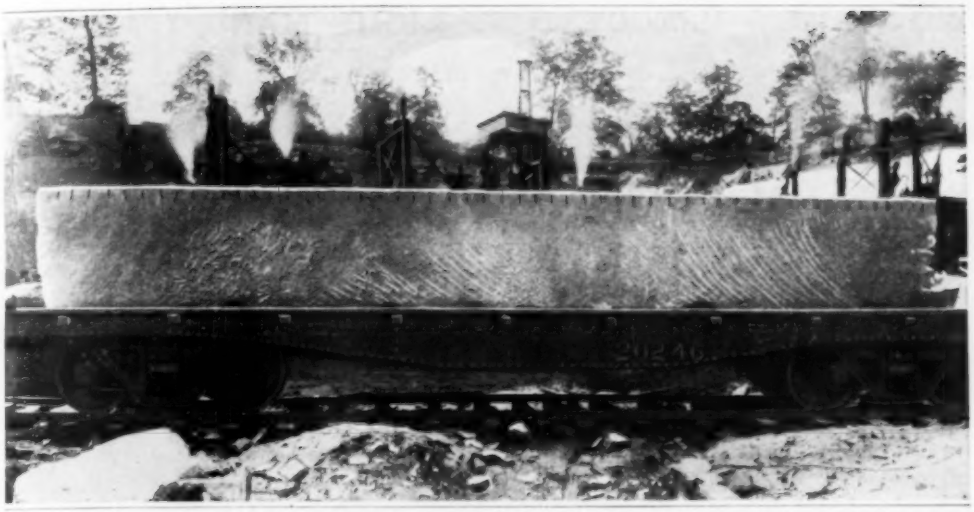
ing tapped without warning upon some portion of the subject's body. Sight is examined similarly, the subject stopping the indicator when he sees the physician has touched the hammer against the table.

The rate of respiration and the heart action are ascertained by a pneumograph and "doigtier" (from the French word "doigt," finger) and an instrument known as a "trembler." The first is fastened about the chest, the second fitted over the first two fingers of the left hand, and the third held in the right hand. Each is connected with a separate stylus that acts on a revolving drum coated with a lampblack preparation. The effect upon the nerves when a photographer's flash light is unexpectedly ignited or a pistol fired from behind is thus recorded by the lines drawn on the drum. The ability of the nerves and muscles to resist fatigue is determined by another device in which the applicant inserts a finger and upon bending it raises a light weight. The finger action is continued until fatigue prevents further movement. Recording instruments indicate whether a man has sufficient endurance properly to manipulate the controlling levers of an air craft for long periods.

BUILD HOUSE WITH VARIED PANELS FOR STUCCO TEST

A patchwork building, whose walls are marked off into 56 stucco panels, each of which differs from the others either in material or the method of its construction, is being built in Washington by the Bureau of Standards for the purpose of testing many kinds of stucco. These sample panels of a building material which is rapidly increasing in popularity have been made with bases ranging from concrete to metal lath. The permanence of some kinds of stucco and the rapid deterioration of other kinds have been an incentive in making this test, which is being conducted by the bureau's building-material experts, with the advice of a committee of practical builders from all parts of the country. In the interior, plaster mixtures are being similarly tested on various bases.

A Structure Having 56 Stucco Panels, No Two of Which Are Exactly Alike, Built for the Purpose of Testing Various Kinds of Stucco and the Bases to Which It is Applied



A 66-Ton Block of Limestone, Quarried at Bloomington, Indiana, Which Is to be Made into a Column for a New York Business Building

BIG BLOCK OF LIMESTONE COVERS FLAT CAR

A block of limestone, almost as big as the large steel flat car on which it was loaded, was recently cut in a quarry near Bloomington, Ind. The huge piece of stone contained 776 cu. ft. and weighed 66 tons in the rough. In loading it, the workmen proceeded with great care, two hours being consumed in rolling it 130 ft. However, the stone company filled the order with dispatch, for it was only 33 hours after receiving it that the stone was on the car ready to be shipped. The block was sent to a stone sawmill to be turned into a column for a business building in New York.

EYE SHADE FOR OPERATORS OF MOVIE PROJECTORS

The eyestrain to which many motion-picture operators are subjected because of the necessity of carefully observing the way in which the intense light from the lamp house is focused on the films, may be eliminated by the use of a movable glass screen which has been invented by an operator in Hardin, Mo. It consists of a pane of colored glass set in a metal frame and hinged to the front of the lamp house by a universal joint so that it can be swung into any position desired. The use of this screen is said to prevent the dimness of vision or partial blindness which often exists for a time immediately after operating a motion-picture projector.

A Colored-Glass Screen Fastened to the Front of the Lamp House Enables the Operator to Watch the Beam of Light, Where It Strikes the Film, without Eyestrain

BIG STUMPS UPROOTED BY LIGHT MANUAL PULLER

For clearing logged-off lands, a very simple and powerful stump puller is made that can be operated successfully by one man. Exclusive of the cables used with it, the contrivance weighs less than 100 lb., and yet is said to be capable of removing in a few moments either green or old deep-rooted stumps of reasonable size. Its portability, ease of operation, and comparatively low cost are pointed out as features which make it especially suitable for the average farmer who is opening up new acreage. Essentially it consists of a steel framework holding a pair of soft-steel clamps that grip and pull upon a block cable as the operating lever is actuated. When in use, it is securely anchored and a pull cable is looped about the top part of the stump to be withdrawn and made fast to the block. There is no waste motion, since both forward and backward movements of the lever operate the mechanism. A distinctive feature of the apparatus is that its speed and power may be regulated to suit different working conditions as they arise.

The Device Attached to Block Cable, Which is Anchored to Stump at Right. Stump to be Pulled Not Shown in Picture

FAIR BUILDING IS NOW HANDSOME RESIDENCE

In one of the suburbs of Portland, Ore., is an imposing residence which formerly was the Massachusetts state building at the Lewis and Clark Exposition, held in Portland some years ago. While most exposition buildings are demolished when they have served the purpose for which they were built, this one so appealed to a wealthy patron of the fair that it was purchased and moved five miles to its present site. It was set in the midst of spacious grounds, and such alterations were made as were required for the convenience of its new owner. The dwelling is regarded as one of the handsomest in the Northwest.

Handsome Residence in a Suburb of Portland, Oregon, Which Was Formerly the Massachusetts State Building at the Lewis and Clark Exposition

Two Views of a Vertical Filing Case for Blueprints: At the Left the Top has been Turned Back and One of the Pockets, Containing Prints, Lifted from Its Supports. At the Right, the Front Side is Shown Drawn Up to Serve as a Table

INDEXED VERTICAL FILE FOR BLUEPRINTS

A careful study of the problem of storing blueprints, drawings, sketches, etc., has resulted in designing a file which, when closed, occupies but 4 sq. ft. of floor space. Material kept in it is not apt to be torn, and remains flat and free from dust. The case stands about 3 feet high and has a hinged top and an especially designed hinged front. The lifting of the top reveals a number of large reinforced Manila pockets, suspended from supports at either side of the cabinet. Each pocket is numbered and contains certain prints which are indexed on cards fastened to the inside of the cover by means of convenient metal holders. By releasing a spring latch the upper end of the front side can be drawn out about 6 inches, thus making more room to get at the pockets. By taking hold of the lower edge of the front side it can be drawn up into a slightly inclined position, thereby transforming it into a drawing or display table, for which two hinged legs are provided. Cabinets are made either of wood or steel.

INVERTED-CROWN PAVING NEEDS NO CURB

The streets of a new residence district in Cedar Rapids, Ia., have been improved recently with an inverted-crown concrete paving. That is, the center of the street is a trifle lower than the sides, so that the water drains down through the middle of the thoroughfare. This makes curbs unnecessary and is said to have proven very satisfactory. In case a pavement that is laid without curbs has the usual curved crown the water will eventually wash away the earth under

Newly Laid Concrete Paving in a Residence District in Cedar Rapids, Iowa, Which Slopes toward the Center and Requires No Curb

the edges. This concrete was laid 5 in. thick and 18 ft. wide, with expansion joints inserted every 30 feet.

Chattanooga's New 2,500-Foot Reinforced-Concrete Bridge, across the Tennessee River, Which Bascule Span of

BIG CEDAR STUMP USED AS A BAND STAND

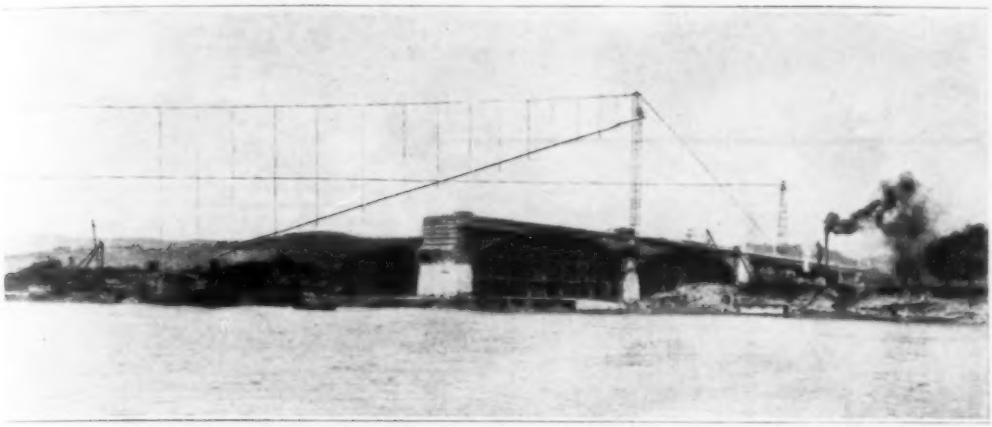
A city park in Tacoma, Wash., boasts of a band stand which is of very unusual, if not unique, design. It consists of a huge cedar stump on which has been placed a platform with a rustic railing. The stump, which is 15 ft. in diameter, was brought from a near-by forest and placed on a concrete foundation. It has been hollowed out so that it contains a room 10 ft.

A Cedar Stump, 15 Feet in Diameter, Which Serves as a Band Stand in a Tacoma, Washington, Park

square. This interior has been furnished with a table, benches, and racks, and serves as a shelter for picnickers.

SOUTHERN CONCRETE BRIDGE HAS LONG BASCULE SPAN

To establish a connecting artery between North Chattanooga and the city proper, a long reinforced-concrete bridge is being erected across the Tennessee River. The structure is particularly of interest because the center span, bridging the main channel, is a jackknife bascule of 300-ft. reach. On account of its vertical clearance, which is 72 ft. when the river is at normal level, it will be unnecessary for the span to be opened for navigation except when the water is unusually high. Electric motors controlled by a single engineer will operate the leaves during such periods. The bridge, when completed, will be about 2,500 feet in length and in addition to the central steel section will consist of four arches of 180-ft. reach, two 165-ft. ones, and nine 40-ft. spans, the latter forming the approaches. It will provide a 36-ft. roadway for vehicular traffic, and on either side will have 6-ft. passages for pedestrians. The floor, which is to be paved with wood blocks, will also support a two-track car line. Work on the structure was begun two years ago and is now approaching completion. Peculiar conditions encountered in the river bed, and exceptionally high stages of water, have combined to make the construction an engineering problem of much difficulty.



is Now Nearing Completion. The Main Channel of the Stream is to be Bridged by a Jackknife Noteworthy Length

SEEK TO MAKE KITCHEN IN HOTEL ABSOLUTELY CLEAN

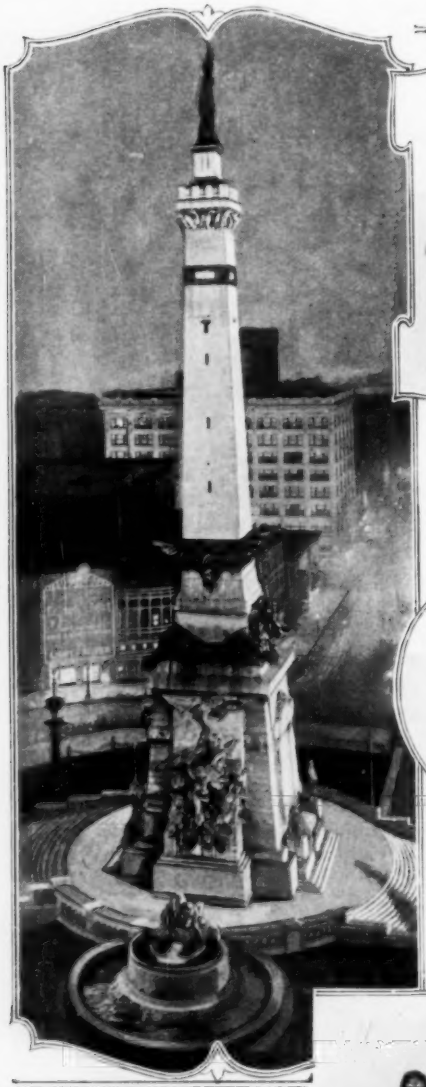
Sanitary precautions, the equal of which perhaps have never been taken by any other hotel, are to be observed in equipping and operating the kitchen of a very large hotel to be erected in New York City. No food of any sort will remain uncovered in the kitchen, unless being cooked in an open dish, and yet all food will be in full view behind or under conveniently pivoted glass covers. All raw materials will be conveyed from one receptacle to another by machinery. The bulk of the work, which helpers and cooks have formerly done by hand, will be done by machines, such as paring fruits and vegetables, making bread, cutting butter patties, mixing salads, etc. All employes will be trained to be as scrupulously clean as attendants in a hospital operating room. Each one will be required to take a bath every morning at the hotel and to pass a daily examination by a health inspector.

ROLLER SKATERS RACE FOR THREE MILES IN SEWER

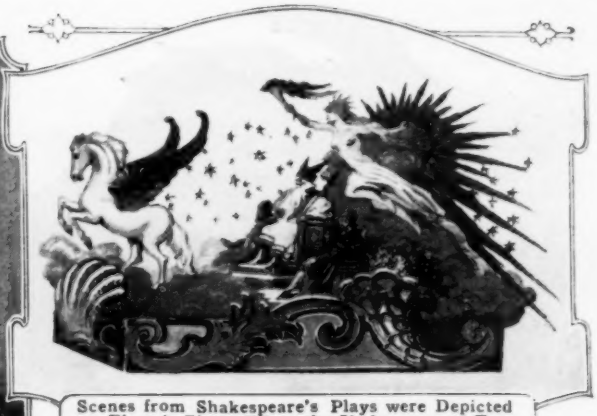
A big storm sewer in Pasadena, Calif., recently served as the course for a very unusual race. Three young men on roller skates raced through the concrete-lined passageway from Colorado Street to the outlet in South Pasadena, a distance of three miles. Each skater illuminated his way with a flash light. The concrete floor of the big tube was not very smooth in spots, and the contestants found some rather rough going. In spite of this the winner, who was a high-school boy of 15, covered the distance in 16 minutes. His two opponents, both skaters of local reputation, finished about a quarter of a mile behind him.

Three Pasadena Young Men Racing on Roller Skates through a Big Storm Sewer. The Winner Covered the Prescribed Distance of Three Miles in 16 Minutes

HIGH LIGHTS IN CIVIC PARADES AND CARNIVAL

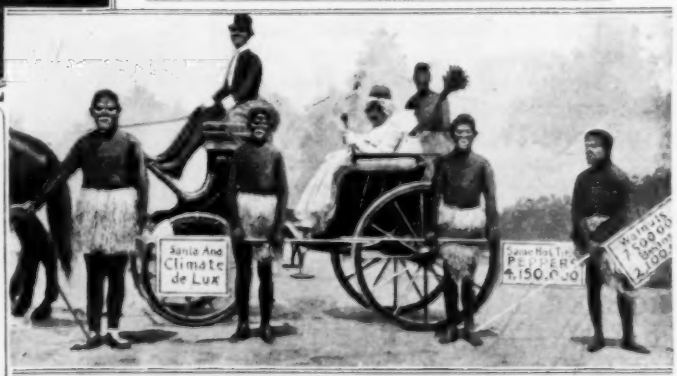


When the Indiana State Centennial was Celebrated Recently, the Big Soldiers and Sailors Monument, Which Extends 284 Feet above the Pavement in Monument Circle at Indianapolis, was Illuminated by Electric Projectors so That It might Be Plainly Visible during the Nocturnal Festivities. Four Batteries, Each Consisting of 24 Separate Lamps, were Mounted on Near-By Buildings and Focused upon the Shaft



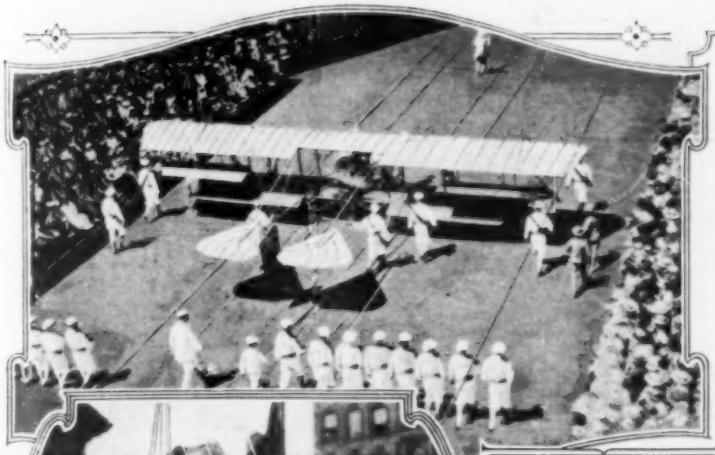
Scenes from Shakespeare's Plays were Depicted on Electric Floats When the Shakespearean Tercentenary was Commemorated at St. Louis during the Veiled Prophet Pageant. The Tableau of the Prophet and High Priests, Shown Above, Led the Procession and Symbolized What Followed

The Float Representing Macbeth Portrayed the Three Witches, as Shown Above. It is Said That This Is the First Time Scenes from Shakespeare's Plays have been Presented in a Pageant of This Kind. Thousands of Dollars were Expended in Carrying Out the Spectacular Street Celebration



The Carnival "Queen" and "Her" Retinue, as Seen Recently in a Night Pageant Held at Santa Ana, California. The Quotation Marks are Used for the Reason That the "Queen" Was None Other than a 300-Pound Man Outfitted in Royal Emblems. The Attendants Were Boys Dressed as Zulus. The Idea Hit a Popular Note and was Well Received

FESTIVITIES CONDUCTED FROM COAST TO COAST



Military Biplane Proceeding under Its Own Power during the Preparedness Parade Conducted at Los Angeles Some Time Ago. The Sight of the Big Machine Traveling in the Streets, Much as if It Were a Motor Car and Entirely Accustomed to Paved Thoroughfares, Evoked Surprise. It was Closely Followed by Marines Who Assisted in Turning the Craft When Corners were Negotiated

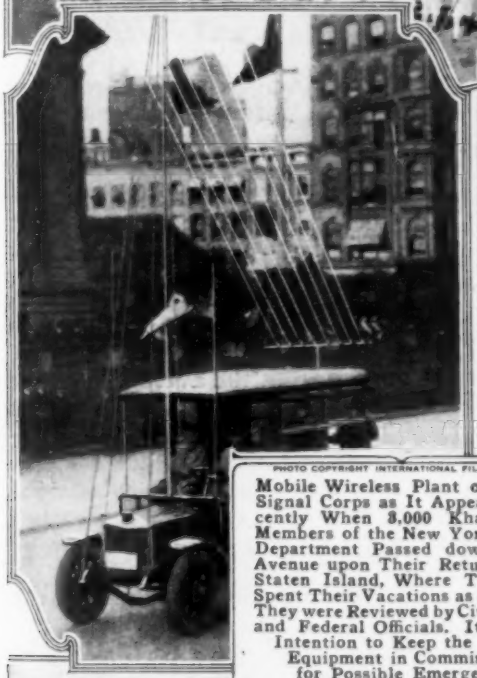


PHOTO COPYRIGHT INTERNATIONAL FILM SERVICE

Mobile Wireless Plant of Police Signal Corps as It Appeared Recently When 8,000 Khaki-Clad Members of the New York Police Department Passed down Fifth Avenue upon Their Return from Staten Island, Where They had Spent Their Vacations as Rookies. They were Reviewed by City, State, and Federal Officials. It Is the Intention to Keep the Radio Equipment in Commission for Possible Emergency

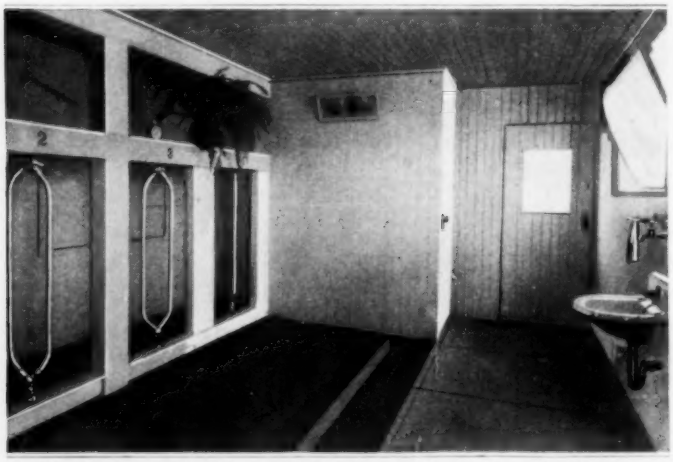
Headed by Veteran Riders of Old "High Wheelers," 500 Cyclists Participated in a Procession That Was One of the Features of the San Francisco Bicycle-Day Exercises and Races at Golden Gate Park

PHOTO COPYRIGHT UNDERWOOD & UNDERWOOD

This Odd and Rather Effective Monument, Covered with Fruits and Vegetables, was Erected on the State Fair Grounds at Syracuse, New York, by Upstate Farmers and Orchardists. Although a Mongrel, Architecturally, the Richness and Variety of Its Colors Made It Attractive in Appearance

DAIRY STABLE FURNISHED LIKE A HOME

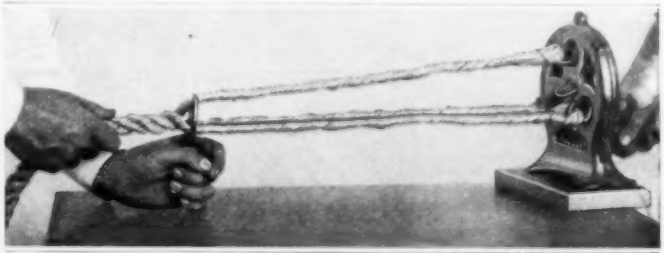
Several features strike the visitor to the stable of a certain dairy in Portland, Ore., as quite remarkable. Pictures hang upon the walls; ferns are placed above the stanchions; the windows are screened and covered with freshly washed curtains; the doors are doubly screened and at one side of the stable is an enamel washbowl with running water. Such unusual conditions are due, in part at least, to rivalry which has sprung up among Portland dairymen, who must obey rigid city rules regarding the production of clean milk. At this dairy each cow is bathed before entering the stable and her bag washed with warm water, soap, and a freshly laundered cloth. The milk is strained through sterilized cotton batting. The cows are never hurried or frightened, and on returning from the pasture are allowed to move along leisurely. The milk in this dairy has improved considerably in purity, the number of bacteria found in it being much lower than in milk from the average dairy.



Striking Features of This Dairy Stable Are the Ferns above the Stanchions, Pictures on the Walls, Curtains at the Windows, Screens over All Openings, and a Washstand with Running Water

STRONG INEXPENSIVE ROPE MADE BY SIMPLE MACHINE

A simple twisting machine, which is being introduced among farmers particularly, can be used in making a number of useful articles. It is patented and is employed chiefly in making rope from binder twine, and such cordage is said to be not only stronger than ordinary rope, but also cheaper. The cord or twine that goes to make up the principal strands of the rope are first caught over hooks that project from a side of a circular iron case containing gearing. By turning a crank the hooks are made to revolve. A device called a threader is used with the machine which is simply a handle, at one end of which are two short diverging arms over which the loops of twine are caught. In preparing to twist a rope the twine is threaded back and forth over the hooks and the corresponding arms of the threader until the desired number of principal strands, which generally is three, will have the desired number of individual strands of twine. When this has been done, one person begins turn-



Making Rope from Binder Twine: A Simple Machine Which Twists the Strands About One Another. The Threader, at the Left, is Used to Keep the Strands Separate and to Make Them Twist Evenly

Above: View Showing a Section of the Main being Lowered into the End of the Trench. Left: Crane Lifting a Section Weighing Four and One-Half Tons

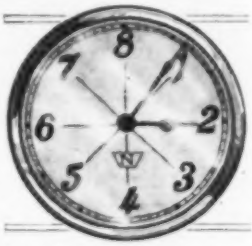
ing the machine while another holds the threader. As the cords in each group twist about one another, so too the strands, which are being made in this way, will tend to twist about each other at the far side of the threader. To make an even rope the threader is moved toward the machine at a slow, even speed. A fourth central hook in the machine is used to finish off the ends so they will not unravel. Fish-line, rag-rug rope, silken cords, etc., can all be made with this machine. It can also be used for splicing rope and thus often proves itself a valuable time saver in emergencies.

BIG WATER MAIN LOWERED UNDER RAIL CROSSING

The recent elimination of a grade crossing in Cleveland involved the lowering of a 36-in. high-pressure water main to a depth of 24 ft. This was a task calling for considerable skill, since some of the sections of the main weighed four and one-half tons. The trench in which this big pipe was relaid was 10 ft. wide at the bottom, to give plenty of room for the workmen and also to allow for bulging that might take place if the earth gave way and pressed against the temporary retaining walls which were placed at either side. Bracing beams were placed from wall to wall at frequent intervals and all sections of the big main were lowered by a crane at one end of the trench and then moved along into position. Six men, with the aid of the crane, laid practically all the pipe at the crossing in one day. A centrifugal pump, with a capacity of 10,000 gal. an hour, kept the ditch dry by carrying off water that seeped into the cut.

EIGHT-HOUR CLOCK DIAL FOR NEW TIME SYSTEM

A San Francisco jeweler has been exhibiting a clock with an eight-hour dial. This novelty in timepieces is constructed to illustrate a proposed system of timekeeping whereby the day is divided into three eight-hour periods, the first beginning at midnight, the second at 8 a. m., and the third at 4 p. m. Near the center of this eight-hour dial is an opening in which the letter M, for "morning," appears during the first period, N, for "noon," during the second period, and E, for "evening," during the third period. These periods correspond roughly to the rest, work, and recreation hours of the average person's day, and so in that respect the new system does not suggest a radical change.



COPYRIGHT, J. P. BECKER

HUGE TERRA-COTTA SIGN BUILT HIGH IN WALL

The office building erected by one of Omaha's leading banks is so situated that one of its outside walls overlooks

A Conspicuous Sign Which is Made of Terra Cotta: It Measures 14 by 44 Feet and Stands 200 Feet above the Street

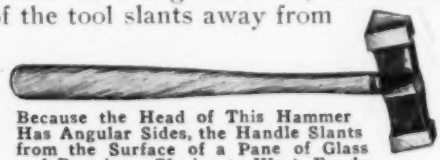
a number of low shops and can be seen a long distance in the business district. Taking advantage of this conspicuous wall space, the owners have built the name of the bank into a blank panel in the wall situated near the top of the structure. This sign is made of green terra cotta and is 14 ft. high and 44 ft. long. The letters project 1 in. from the wall, which is of white brick, and so are made very prominent. Beneath the sign an iron balcony is to be constructed to support powerful electric lights for the purpose of illuminating the lettering at night. The sign is 200 ft. above the street. The upkeep cost of this fine sign probably will be small.

EMERALDS MORE COSTLY THAN DIAMONDS

In the mind of the average person the diamond is regarded as the most valuable of precious stones, but as a matter of fact large flawless emeralds are a great deal more costly than diamonds of similar size. One of the considerations that makes these rich green gems so high-priced, if perfect, is that they are seldom free from flaws. According to the Smithsonian Institution good diamonds at the present time are worth from $250 to $400 per carat, according to purity and size, whereas an emerald varies from $350 to $500, the price increasing rapidly with size. Flawless emeralds weighing more than four carats are practically priceless, but diamonds of that size are worth only $1,000 or $2,000. Another factor which contributes to the high price of emeralds is that they are hard to imitate and, unlike some green stones, retain their color when heated and when subjected to artificial light. This latter fact makes them particularly desirable for evening wear.

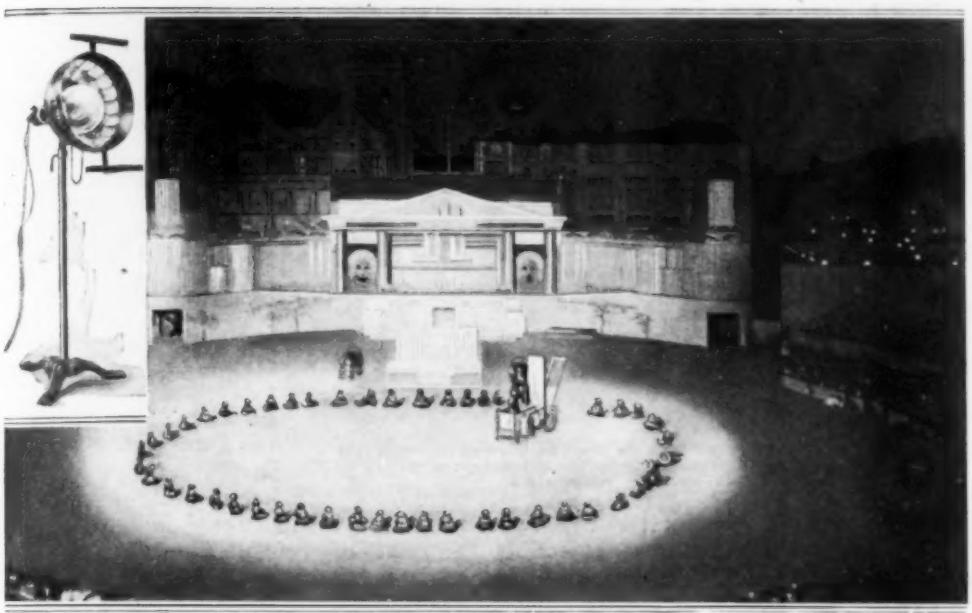
WINDOW PANES EASILY SET WITH GLAZIER'S HAMMER

For setting panes of glass in window and other frames, a hammer is available which facilitates the work by giving a glazier perfect freedom in driving points, and also lessens the liability of accidental breakage. The tool is but little heavier than an ordinary tack hammer and provided with a double-faced head of trapezoidal form. Because of the shape of the faces, which have angular sides, the handle of the tool slants away from



Because the Head of This Hammer Has Angular Sides, the Handle Slants from the Surface of a Pane of Glass and Permits a Glazier to Work Freely

the flat surface of the glass when being used, thus permitting a workman to strike the points squarely and without difficulty.



Flood-Lighting a Circular Area 100 Feet in Diameter in the Middle of the Stadium, Where Much of the Masque was Presented. It was Accomplished with Nitrogen-Filled Incandescent Lamp Projectors Which were Hidden from the View of the Audience so Completely That the Source of the Illumination Was a Matter of Speculation

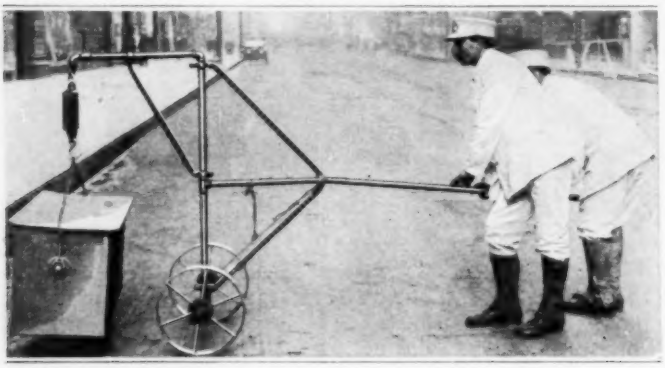
INCANDESCENT LAMPS USED FOR PAGEANT LIGHTING

Splendid lighting effects were obtained during the production of a Shakespearean masque in the stadium at the College of the City of New York some weeks ago. Rather difficult conditions were overcome in a very creditable manner, and the interesting point is that high-power, nitrogen-filled lamp projectors were employed almost to the entire exclusion of arcs. The stadium has seating capacity for about 20,000 persons and presents large areas for illumination. The stage is more than 300 ft. from the tower where the battery of lamps was mounted. In a ring of 100-ft. diameter, in the middle of the stadium, some 1,500 actors performed. The spot was flood-lighted in a most striking way. Varicolored illumination of the different settings, lighting of the stage with scenic effects, and screening the stage from the view of the audience by a curtain of light were some of the other things accomplished. Although abundant light poured upon restricted areas, the spectators were unable to determine its sources. By telephonic communication with various operators, the stage director controlled the lighting effects. Several lamps with glass-lined reflectors were placed in front of the stage settings and directed toward the tiers of seats while the audience was filling the stadium. Because of their distance from the spectators, their glare was not objectionable, although sufficient to screen the stage completely. By concentrating spot and flood lights so that the attention of the spectators was riveted upon the performers, removal of used and the setting of new scenes could be carried on without notice. Then, by dimmers, the light was dissolved from one setting to another.

PORTABLE SCALE WEIGHS STREET SWEEPINGS

A portable spring scale of unusual design has been constructed for the Citizens' Street Cleaning Bureau of Chicago, and is employed in weighing the sweepings deposited in the various

refuse boxes, which are set along the street curb. The device consists of an iron framework supported by two wheels and having an arm projecting in front from which a spring scale is suspended. The truck is pushed about by a long handle. When a box is to be weighed a chain is fastened to the knobs projecting from either end of the container, and the hook of the scale is caught in the chain. To throw the weight onto the spring it is only necessary for the sweeper to press down on the handle, which results in lifting the refuse box off the ground. The device is used from time to time in ascertaining the exact amount of sweeping each workman does and also the amount of refuse which collects in various blocks.



An Unusual Type of Portable Scale Used in Chicago to Ascertain the Amount of Work Done by Each Employe of a Street-Sweeping Association

DOOR BUILT TO RECEIVE DELIVERED GOODS

The problem which arises when the delivery boy finds no one at the address to which he is to deliver a package, has been solved by constructing a kitchen door with which has been combined a sort of cupboard. The lower half of the outside of this door is divided into hinged panels, each of which, when opened, reveals a small compartment. These are of various sizes and labeled on the outside for meat, groceries, laundry, the daily paper, milk, etc. The shallow cupboard, which is made up of these compartments, projects but a short distance into the kitchen. Access to the cupboard from the kitchen side is gained through a single large door. It will be found that this device will save both the delivery boy's time and the housewife's time, since all packages can be deposited in it without delay. It also does away with the necessity of allowing strangers to enter the kitchen. The hinged panels are left open when a delivery is expected, and after being pushed shut by the delivery man cannot be opened from the outside.

Left: The Door from the Kitchen Side, Showing the Manner in Which Parcels can be Left in It Even When the House is Locked. Right: View of the Kitchen Door from the Outside

¶On its return trip the "Gullfoss," the first Icelandic ship to sail to America in historic times, included in its cargo a consignment of musical instruments from Chicago.

TRYING TO BEAT THE BLOCKADE

Things the Dragnet of the British Postal Censorship Catches in the First-Class Mail

By R. J. BJURSTEDT

IT was early in the present year that a search of the baggage of a German lady who was booked to sail from New York to Rotterdam by a Dutch liner revealed the astonishing fact that three of her 15 trunks were filled with sole leather and the remaining 12—of an aggregate weight of over a ton—with hunks of crude Para rubber. In her stateroom were found a suitcase full of dental rubber and a box of honey jars filled with rubber solution. To cap the climax, several hundred yards of pure-rubber surgeon's bandage—weighing close to fifty pounds—swathed her body from hips to shoulders. She was led into the searching room a stout waddling Fräulein of apparently 200 pounds, her ample figure fairly bursting the hooks and seams of her fashionable traveling suit; she came out five minutes later a scrawny dame of 150 floundering in the folds of the same suit like a contestant in a sack race.

I told this story to an official of the British postal censorship in the course of a recent visit I paid his remarkable establishment through the courtesy of the war office.

"Very well," he laughed; "you have seen what the Germans have tried to do with the females in order to get the rubber and other things of which they are short. Now you shall see what they have tried to do with the mails. I will show you practically every article, from imitation pearls and brass jewelry to bags of rice and rolls of tanned cowhides, that you might expect to find in a modern German industrial exposition; indeed, I am able to show you a few things that have heretofore not been displayed in any kind of an exposition, such as, for instance, models of little steel hooks to be mixed with oats and fed to horses."

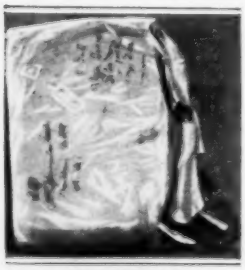
It is not my purpose here to touch upon the technical aspects of the British blockade, but merely to mention a few of the things which have been stopped by England in their passage through the first-class or letter mail and let my readers draw their own con-

One Corner in the British Postal Censor's "Library" and "Museum." Classified in the Cases at the Left Is Propaganda Matter of Every Description, and at the Right, German Goods Taken from Outgoing Mail

clusions as to whether the action is justified or not. I might mention in passing that the presence of some of

Rice and Ham Caught by the Censor. The Wrapper in Which the Meat was Mailed, at a Cost of Four Dollars, is Shown at the Left. The Rice was Packed in a Roll of Newspapers: A, Sack of Rice; B, Rolls of Paper, and C, Newspaper Wrapping

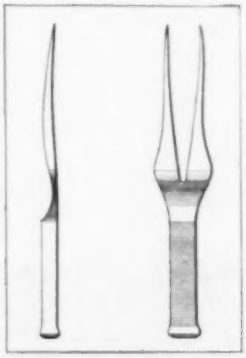
the bulkier articles in letter mail, at first-class rates, throws an illuminative side light on Germany's needs of certain lines for which all her ingenuity has failed to provide entirely satisfactory substitutes.



Pair of Shoes, Wrapped in a Large Piece of Sole Leather and Mailed at the Letter Rate, About $2.50. Thousands of Such Articles Are Kept in the Censor's "Museum"

The British censor's "museum" is really a sample room, and fully to appreciate what it means one has to consider how each of the several thousand different articles exhibited there are multiplied many thousand times in value or weight by similar things stored away in great warehouses. That black chunk of Para rubber represents the many tons of the valuable caoutchouc that had tried to make its way to Germany in the letter mail; that tube of red litharge, many tons of the valuable oxide of lead; that pair of stout shoes, many thousand cases, and so on. One of the most arresting displays is a 10-ft. long roll containing a single cowhide, the wrappings still bearing something over 40 dollars' worth of American stamps.

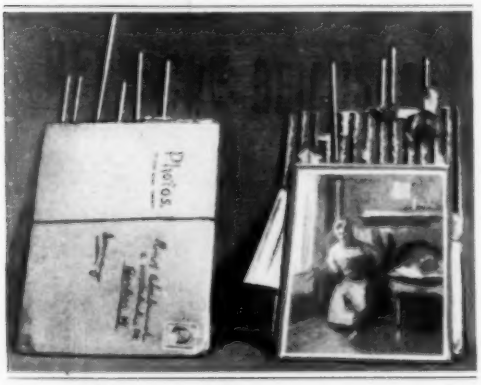
This hide, with other articles such as boots, beltings, and bars of various metals, were evidently sent quite openly in the hope that the fact that they were consigned to the letter post would carry them through in any event. Other things—especially since it became known abroad that the British were searching the first-class mail bags—displayed the greatest ingenuity in the manner in which they had been disguised or concealed. One of the cleverest things was a "honeycomb" made of pressed sheets of thin yellow rubber, filled with a "honey" of rubber dissolved in benzine. In several instances the "honey" was even found to have been sweetened by the addition of a little corn sirup, something that could easily be "washed" out as occasion arose for the solution again to perform its functions as rubber. Thin sheets of superfine dental rubber often appeared stuck between cardboards, and the corrugations of the pasteboard used to protect photographs made convenient nests for slender bars of nickel and aluminum, hundreds of pounds of both of which have been snagged in the censor's net. Photographs were formerly passed along unopened, but



Tiny Grain-Colored Steel Forks Found by French in Oats Shipped from America. Deaths of Many Army Horses from Perforation of Bowels Caused Discovery

the discovery of the extent to which they were being employed as "carriers of merchandise" finally brought them under the ban. Now practically nothing from a post card up goes unscrutinized.

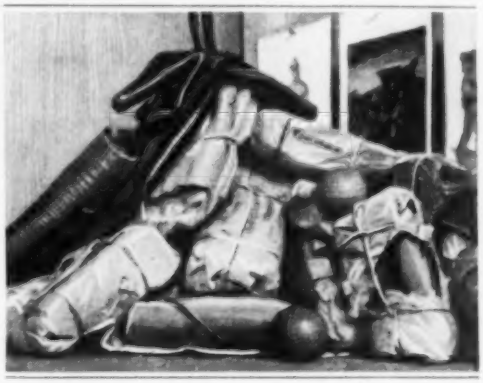
Many of the most ingenious schemes for smuggling appear to have been worked out in Germany and transmitted to overseas Germans by post; indeed, several of them were discovered through the reading in England of outgoing letters from the Fatherland. It was in this way that the first hint was obtained of the plan to mix the small steel hooks in the oats that were being bought by the allies to feed their cavalry horses. Models of these hooks, similar to that shown in the accompanying cut, were found in the mails to both New York and Buenos Aires, with the gruesome commentary that "exhaustive experiments had proved their absolute efficiency." There were also drawings of the machinery by which they should be made, directions for giving them a "protective" yellow coloring in some kind of a chlorine bath, and suggestions as to the best means of "planting" them "where they would do the most good." Although such precautions as were



Bars of Nickel, a Much Needed Metal in Germany, Found Concealed in the Corrugations of the Cardboards Protecting a Photograph Mailed to a Private Address in Berlin

practicable at the time were taken to minimize the danger from this menace, considerable quantities of these cruel devices appear to have been successfully "planted," and a few—mercifully, a very few—to have effected the terrible end for which they were designed.

Rice has been appearing in rapidly increasing quantities in the recent



Rubber in Different Forms, Even Molded in the Shape of Golf Balls, Culled from the First-Class Mail Matter by Alert Censors

seizures, and the similarity of the methods employed in concealing the bags, which are mailed from all quarters of the globe, seems to indicate the "Made in Germany" origin of the very clever scheme. About a pound of rice is sewn up in a little cylindrical bag approximating an inch in diameter and a foot in length. At each end of this, whorls of tightly rolled newspaper of the same diameter are placed, and around this central core several heavy newspapers are wrapped and bound firmly with a network of stout twine. The stamped and addressed package, with its ends open for inspection as required, looks perfectly innocent, and feels perfectly innocent, and it is probable that a good many of the fat rolls of foreign newspapers went through unsuspected until a leak gave one of them away one day and resulted in holding up the whole stream for "the duration of the war."

¶So popular have ukuleles become that the Hawaiian output of these musical instruments has increased in a year from approximately 500 to 1,600 a month, without being able to meet the demand.

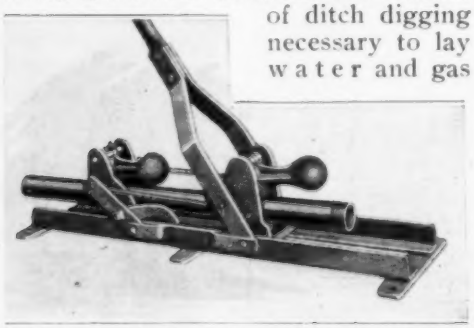
SIXTY-TON BRIDGE MOVED OVER TWO MILES

A highway bridge, mounted on trucks, was recently drawn through the streets of Missouri Valley, Iowa. Instead of erecting a new bridge at a certain site, the unusual procedure of moving this structure from its original base to the new location was proposed. To do this the bridge, which was of steel construction with a concrete floor and weighed 60 tons, was mounted on three mover's trucks, two at the forward end and one at the rear. It was drawn slowly along the thoroughfare by means of a cable and capstan, turned by a team of horses. Braces were fastened above the rear end of the bridge to prevent sagging of the frame.

Above Is a Rear View and Below Is a Front View of a 60-Ton Highway Bridge on Its Journey of Two and One-Half Miles through Missouri Valley, Iowa

PIPE PUSHER LESSENS DITCH DIGGING

A pipe pusher has been devised which is intended to lessen the amount of ditch digging necessary to lay water and gas pipe. It consists of a set of clamps and levers mounted on a metal framework which can be staked securely to the ground. The pipe is inserted between the clamps and, by operating a handle back and forth, it is forced into the ground a few inches at each stroke. It is claimed that a pipe can be driven 50 or 100 ft. in this way. Thus it can be pushed through the earth from a cellar to a main in a street, or to a cistern near by. The machine can be employed also to draw out old or damaged pipe.

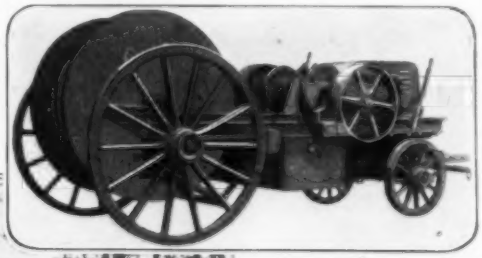


A Machine with Strong Leverage That Forces Pipe through the Ground. Thereby Lessening the Amount of Digging Necessary to Lay the Pipe

¶The War Department has recently purchased 27 American-made cars of the caterpillar type.

CONSTRUCTION OUTFIT MADE FOR LINE WORK

To lessen the labor cost and facilitate the reconstruction and extension of telephone lines, a cable-handling and general-construction machine has been devised which enables three or four men to accomplish quickly what ordinarily requires a gang of a dozen or more a longer time to complete. The equipment, mounted on a stanchly built horse-drawn wagon, will load and transport cable or wire reels of various sizes, wind or unwind them, and wind from one spool onto another. Furthermore, it is designed to pull cables through or out of underground conduits, and wind up or down aerial cables or wires. It includes a hoisting apparatus which permits a 60-ft. pole to be lifted on end and lowered into a hole, or removed and placed on the ground. A stationary gas engine supplies the operating power. The frame and lifting lever are supported by the rear axle, which is U-shaped and made of forged steel. A strong pulley is attached to this shaft and connected with a sprocket on the drum shaft by a chain, when winding is to be done. The derrick is 18 ft. in length and when mounted for use rests across the reel shaft. The hoisting rope is extended from the drum through a sheave at the end of the boom and fastened near the boom seat. It requires little labor to remove a reel and rig the derrick.



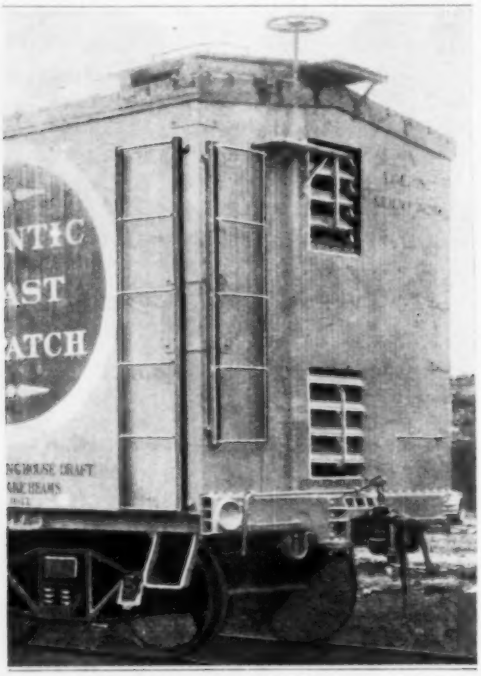
Two Views of the Telephone Construction and Cable-Handling Apparatus, the One Above Showing a Reel in Place for Unwinding, and That at the Left Indicating How the Derrick is Mounted. In Addition to Placing and Removing Poles, the Equipment is Arranged to Pull Lines through and Out of Underground Conduits and Do Other Work. It is Said to Cut Labor Cost Materially

SPECIAL EARCAP FOR TELEPHONE RECEIVER

With a view to making a telephone receiver transmit sounds more clearly under varying conditions, a special earcap has been invented, which takes the place of the regular earcap on the receiver. In shape this device resembles the part which it displaces, except that there are several vents or indented channels which radiate from the center of the cap to the rim. These allow the passage of air in and out of the ear, even though the receiver is pressed close against it. The purpose of this is to prevent indistinct or conflicting sound waves striking the ear drum. It is the claim of the inventor that this form of an earcap relieves sensitive parts of the ear from strain in using a telephone and prevents the deafness and even general nervous disorders that sometimes afflict switchboard operators.

THIEF AND WEATHER-PROOF VENTILATOR FOR CAR

Weather-proof car-ventilating shutters constructed of malleable iron and so designed that they can be sealed



Ventilating Shutter can be Sealed in Any Position and Provides an Opening of Generous Size Which is Also Said to be Burglar-Proof

either when opened or closed, are being introduced. The appliance is produced in two types, one of which is intended solely for ventilating purposes, and the other supplied with an opening that facilitates the loading of lumber and similar materials. As a ventilator, the device is suited for either box or fruit cars. Its installation is not restricted to the ends of a car, for if it is desired, the appliance may be put in the side walls and made to take the place of ventilated doors. The two types are made of standard parts heavily riveted, are interchangeable, and provide air passages of generous proportion. Furthermore, whether opened or closed, they are claimed to be burglar-proof. The ventilators should outlast the cars to which they are applied.

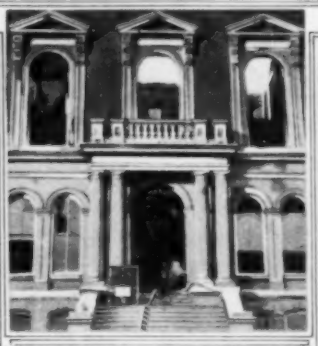
DAILY AERIAL TRIPS MADE ACROSS ENGLISH CHANNEL

In writing from France some weeks ago, one of the American correspondents gave a detailed account of how the British replenish their supply of air craft on the Somme front by flying new planes across the channel from factory to field. During favorable weather the trips are made almost daily, a dozen or more machines being driven into France, the pilots returning to England by steamer, after making the delivery, to repeat the routine the following day. The particular flight of which he writes was completed in 17 minutes, although better time is made when the crossing is undertaken at a narrower point. To those who recall the pioneer days of the aeroplane, these daily flights from England to France, made in as matter of fact a way as if motor trucks were being delivered overland from South Bend to Chicago, hold deep significance. It is only about seven years since the whole world cheered Louis Blériot when he flew a midget monoplane from Baraques to Dover and won the London Mail's $5,000 prize. Blériot traveled about 23 miles in 37 minutes with a fragile craft, the framework of which weighed only 42 lb. It was powered with a three-cylinder, 22¼-hp. motor of 132 lb. The contrast shows in a most striking way the progress attained in aerial navigation during a most brief span of time.

THOUSANDS WATCH FATAL ST. LOUIS FIRE

One of the most spectacular fires which St. Louis has witnessed in years took place recently when flames completely gutted the central building of Christian Brothers College in that city. Ten persons lost their lives. The building was situated on a high hill and was surmounted by a large dome, visible far and near. Thousands of persons assembled at distant points and on the school campus to watch the fight which the firemen waged against

View of Wrecked Rotunda of College Showing Unharmed Statue of St. La Salle



View of Main Entrance After the Roof Collapsed. The Line of Hose Seen on the Steps was Cut by Falling Debris

One Man Jumped to His Death When He might have Used the Fire Escape Shown at End of Wing

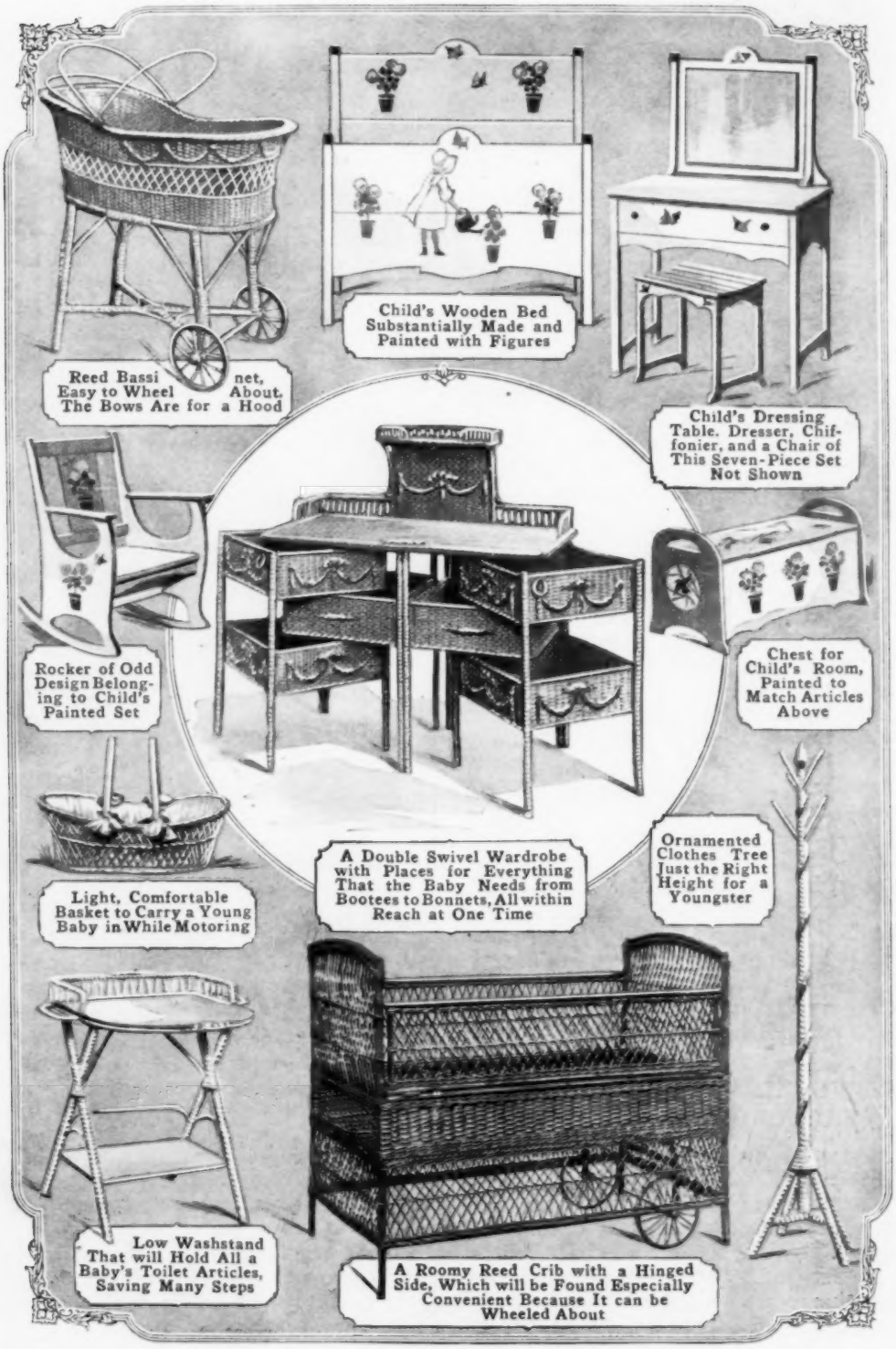
the flames. For some reason the fire walls in the building did not stop the progress of the blaze and it ate away the supports of the dome, which fell down through the rotunda and through the main floor into the basement. Later an interior wall collapsed, killing six of a group of firemen located on a lower floor. One of the unusual features of the fire was the fact that a statue of St. La Salle, founder of the order of Christian Brothers, escaped damage. The statue stood at one side, in the rotunda, and when the dome fell it brought with it large portions of the railed balconies on the various floors, but the figure of the saint was hardly touched. One man lost his life leaping from a fifth-story window when he might have used a fire escape not far away. The total damage to building and equipment was $275,000, it is estimated.

TWO-CHAMBER OIL FORGE BURNS BUT ONE FLAME

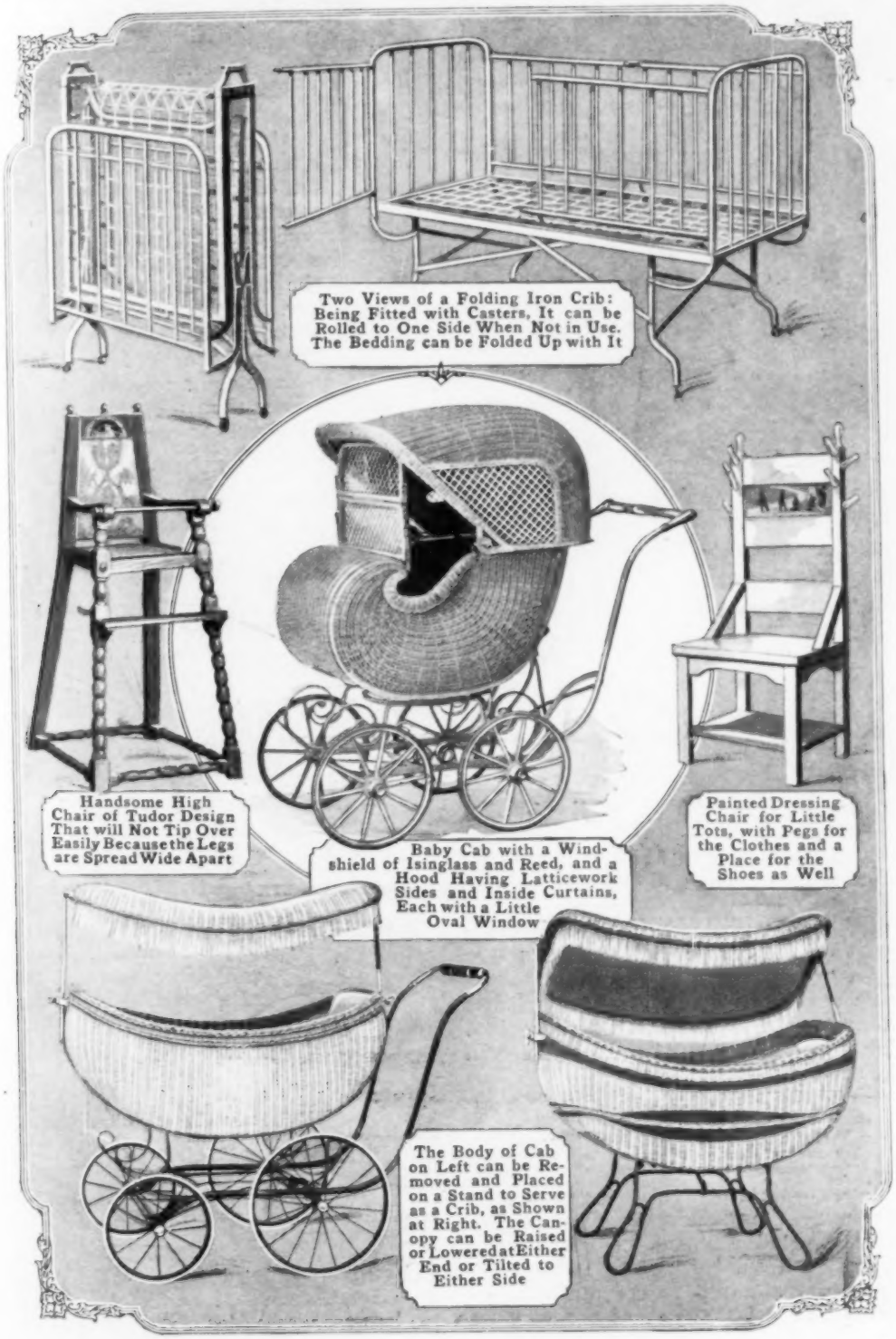
An oil-burning forge has recently been manufactured in which a single flame is made to do nearly twice the amount of heating that it does ordinarily. This increase in efficiency has been secured by placing a second heating chamber above the one commonly found in such forges and by so directing the flame that it heats both compartments. The temperature in the chamber immediately above the oil burner is, of course, slightly higher than in the upper one. For this reason the work is first heated in the upper chamber and then brought to the final temperature in the lower compartment. This increased capacity of the forge requires but little more fuel than a single-chamber model.

An Oil Forge Which Has Two Chambers Instead of One and Yet Requires Little Additional Fuel

ARTICLES OF ORIGINAL AND ARTISTIC DESIGNS


Reed Bassinet, Easy to Wheel About. The Bows Are for a Hood
Child's Wooden Bed Substantially Made and Painted with Figures
Child's Dressing Table. Dresser, Chiffonier, and a Chair of This Seven-Piece Set Not Shown
Rocker of Odd Design Belonging to Child's Painted Set
Chest for Child's Room, Painted to Match Articles Above
A Double Swivel Wardrobe with Places for Everything That the Baby Needs from Bootees to Bonnets, All within Reach at One Time
Ornamented Clothes Tree Just the Right Height for a Youngster
Light, Comfortable Basket to Carry a Young Baby in While Motoring
Low Washstand That will Hold All a Baby's Toilet Articles, Saving Many Steps
A Roomy Reed Crib with a Hinged Side, Which will be Found Especially Convenient Because It can be Wheeled About

BUILT FOR CONVENIENCE OF MOTHER AND CHILD



Two Views of a Folding Iron Crib: Being Fitted with Casters, It can be Rolled to One Side When Not in Use. The Bedding can be Folded Up with It

Handsome High Chair of Tudor Design That will Not Tip Over Easily Because the Legs are Spread Wide Apart

Baby Cab with a Windshield of Isinglass and Reed, and a Hood Having Latticework Sides and Inside Curtains, Each with a Little Oval Window

Painted Dressing Chair for Little Tots, with Pegs for the Clothes and a Place for the Shoes as Well

The Body of Cab on Left can be Removed and Placed on a Stand to Serve as a Crib, as Shown at Right. The Canopy can be Raised or Lowered at Either End or Tilted to Either Side

VENDING WAGON RESEMBLES SMALL AUTO TRUCK

A vending wagon which looks like a small automobile truck has been built by a man in Old Orchard, Me., for

Vender's Wagon Built to Resemble a Small Automobile Truck and Containing Compartments for Frankfurters, Rolls, Peanuts, and Popcorn

dispensing popcorn, peanuts, Frankfurters, and rolls. The body of the car, which is 7½ ft. long and 3 ft. wide, has a number of compartments, and is mounted on four bicycle wheels. What appears to be the engine hood, is an oven in which rolls and Frankfurters can be kept warm by a gasoline burner. Immediately behind this hood, which is of polished copper, is a container for peanuts, with a capacity of one bushel. The chauffeur's seat is occupied by a large doll. A cash register is part of the equipment. In the lower part of the body of the wagon is storage space for sausage and rolls. At the rear is a burner and a corn popper. The vehicle is pushed and steered from the rear.

FINDING SHIP'S DRAFT IN FRESH WATER OF CANAL

It is quite a complicated problem to compute the difference between the draft of a ship in salt water and fresh water, and so, for practical purposes, the government's representatives located in the Canal Zone have adopted this simple formula: For fresh water add one-fourth of an inch for each foot of draft in sea water. This is used in calculating the draft of ships as they pass through the fresh-water sections of the canal. A ton of clean fresh water contains approximately 36 cu. ft. and a ton of clean sea water contains approximately 35 cu. ft. These figures were used in arriving at the above rule, but there were other facts to be taken into consideration also, namely, that there is sediment suspended in the water in the canal cut, due to dredging operations, and that the water-plane areas are smaller near a vessel's keel than near the surface. For practical purposes the above rule makes sufficient allowance for these factors.

MOTORIST'S SIGNAL LIGHT WORN LIKE WRIST WATCH

A small electric lamp, which is carried on the back of the hand, has been designed for use at night by automobile drivers. The habit of holding out the hand when about to stop or turn a corner is almost instinctive with every motorist, but in the dark such a signal may be wholly invisible. This lamp, which is 3 in. in diameter and 1 in. thick, is worn like a wrist watch, except that it is fastened by an elastic to the back of the hand instead of to the wrist. Its two-candlepower bulb is supplied with current through a fine silken cord attached to the dash. The lamp is equipped with a ruby bull's-eye which is sure to attract attention. The words "Safety First" are cut into the face of the lamp around the bull's-eye.

¶Discarded motor-car tires are being used by New England fishermen as fenders for their boats.

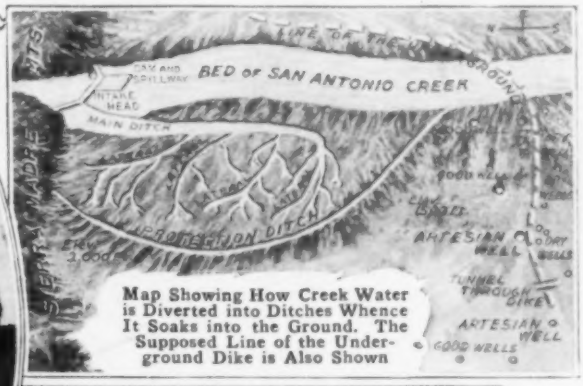
UTILIZING FLOOD WATERS TO REPLENISH IRRIGATION WELLS

By VICTOR W. KILLICK

MUCH devastation has occurred in years past on valuable horticultural properties in the Southwest through flood waters that come tearing down the mountain cañons and ravines during violent rainstorms. Annually, many tons of water have gone to waste, doing millions of damage to property.

With the rapid development of this section, its startling increase in population, and vast investments, such conditions are destined to be controlled. In fact, the flood-water menace has in so many places become a source of profit by its use for irrigation purposes, that today claims have been filed for the right to use all flood water coming out of every mountain cañon in southern

Several Wells Which Barely Bubbled Before, Flowed Like This After the Water Was Spread



Map Showing How Creek Water is Diverted into Ditches Whence It Soaks into the Ground. The Supposed Line of the Underground Dike is Also Shown

A View of San Antonio Creek Bed, Which Is Almost Dry, with Dam in Foreground, Which Diverts Flood Water to the Right. This Rocky Soil is Well Adapted to Absorbing the Water

California. Many legal contests have occurred between the claimants, but the courts have established a precedent of awarding claims to those parties or concerns who can show their ability to make the widest possible use of the flood water.

Recently the Los Angeles courts awarded flood-water rights to a company in the Pomona Valley because it was able to demonstrate the existence of a natural, underground range of clay hills in the valley, which acts like a dike, or dam, tending to create a subterranean reservoir for underground waters. Their idea is to spread the flood water uniformly over this area that it may collect in the big underground basin and so replenish irrigation wells at lower points in the valley. Pomona Valley lies at the foot of the Sierra Madre Mountains and in the path of San Antonio Creek, one of the largest and most damaging flood-water streams along the whole range.

As soon as the legal fight was won, the company bought about 2,000 acres of rocky, sagebrush-covered land at little expense. This was immediately on the west side of San Antonio Creek and abutting the foot of the mountains. A concrete dam was next constructed across the mouth of the creek with a flood-water intake just west of it. From the intake heading a wide shallow ditch, a mile long, was run parallel with the creek. From this, at uniform intervals, lateral ditches were made running westward, and as these extended over the ground they gradually subdivided into smaller and smaller tributary ditches until the porous granite soil drank up all the water distributed. A large protection ditch was then made to bound the extreme western edge of the distributing ground so that if any water got away it would be diverted back into San Antonio Creek at a point below, and thus save possible damage to other property.

During 1915, 18,000 acre-feet of flood water was taken in at the intake and spread over 600 acres at an operating cost of only $2,216. An increase in the water levels of the wells at lower elevations was noted within six months. Wells formerly pumping at lifts of from 60 to 90 ft. now had lifts of only 10 to 20 ft. Other wells of shallow lifts became artesian and flowed above the surface without pumping. Careful calculation showed that of the amount of waters spread, fully 35 per cent was recovered in the wells during the season. The project was affecting the wells which supplied 12,000 acres with irrigating water and five cities with domestic water—a territory of approximately 20,000 persons.

To a country where water for orange groves costs from $5 to $50 a year, this has been a tremendous profit, not counting the saving in damage to property which the uncontrolled storm waters were wont to create.

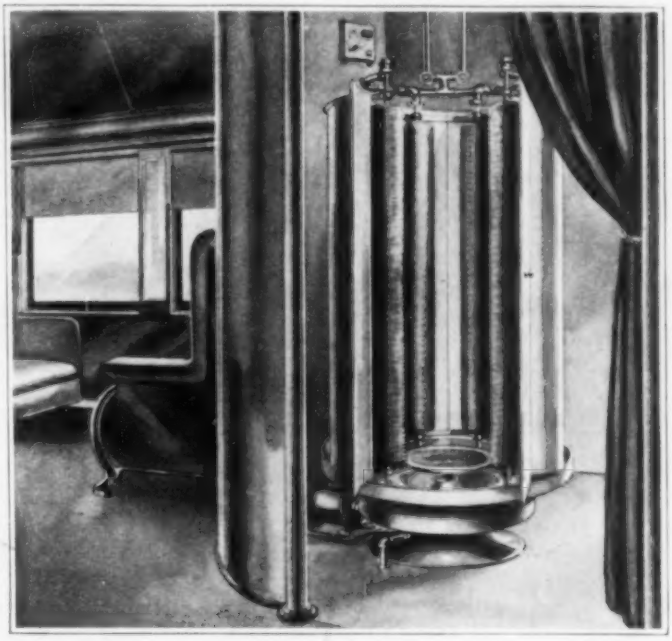
This system of flood-water conservation could be readily applied with effect in many other localities at the base of mountain cañons, even where the topographical features may not be as favorable as are those in the Pomona Valley.

The big Lake Hemet dam in the San Jacinto Mountains, which impounds 4,000,000,000 gal. received from a watershed of 65,000 acres, cost, with its conduit systems, approximately $2,000,000 and effects the irrigation of 10,000 acres in the Hemet and San Jacinto valleys. The Bear Valley dam in the San Bernardino cost, with its entire network of distributing conduits, about $4,000,000. It impounds 22,000,000,000 gal. and effects the irrigation of 15,000 acres.

The water-spreading project of the Pomona Valley people has cost less than $50,000 to construct and is accomplishing results far out of proportion to the amount of money expended. Its financing, so far, has been met by voluntary contributions of the land owners forming the company. Hundreds of people living in the region are receiving the benefits of the project without paying a cent, but those who are paying consider they are getting more than their money's worth out of the results.

BATHING AND MASSAGING MACHINE

A machine has been invented which is designed to bathe the body quickly and thoroughly and at the same time give it a massage. The device is inclosed in a vertical cylinder having hinged double doors through which the bather enters. He stands on a platform, which can be adjusted so that his head projects above the cylinder, and is surrounded by long cylindrical brushes placed on end. These can be made to revolve rapidly by turning an electric switch which controls a motor. By opening a tap, water is allowed to flow into the brushes which throw it against the body. Under the platform is a basin from which the used water flows off through a drain. If, after the water is shut off, the brushes are allowed to revolve, they and the bather are soon dried without the use of towels. The apparatus can be sterilized by running boiling water through it. Because it occupies but little space, its inventor believes it suited for use in sleeping cars, on passenger boats, etc., as well as in private houses.



A Machine Which Bathes and Massages the Body Quickly, and Dries It without the Use of Towels. Because It Occupies Little Space It is Intended for Use in Sleeping Cars as Well as Private Residences

SHORTHAND SOON LEARNED BY USING NEW MACHINE

A machine for writing shorthand has been brought out recently which employs a code so simple that one can learn to read it in a few minutes, though of course speed in using the machine requires practice. In the center of the keyboard is the spacer. To the left is a group of keys used to represent the initial sounds of words. In front of the spacer are four keys labeled with the vowels except U, which is written "IE." To the right are keys used to represent the final sounds of words. Many keys represent two letters of similar sound and are marked with characters designed by combining the two letters. For example, one key represents M and N and is marked with a character in which those two letters have been

A Machine Which Writes Shorthand: The Code Used Is so Simple That One can Learn to Read It in a Few Minutes. The Characters are Printed on a Paper Ribbon, a Word to a Line

combined. Another key represents S and Z, and so on. Words are written according to sound, and all the keys used for a word or syllable are struck at once. This is what makes speed in writing possible. "Begin" is spelled "begn" and is written by pressing the "b" key on the left, the "e" in the vowel group, and the "g" and "n" in the right-hand group, all at one time. The machine prints its characters on a narrow paper ribbon, one word to a line. As the keys are released the paper is spaced automatically. It is said a speed of 175 words a minute can be acquired within a short time.

ISINGLASS FACE SHIELD FOR AUTOMOBILISTS

Isinglass face shields are now being introduced among automobilists to be worn instead of goggles. The new protector consists of a sheet of isinglass, measuring 14 in. long and 7 in. wide, which fastens about the head and is worn under the hat or cap. The edges are bound with felt, and rubber bands at the back help hold it in place. The shield protects the whole face from wind, dust, and rain and does not subject the eyes to the strain that is sometimes caused by certain kinds of goggles.

FARMS GIVE WAY TO MINES IN OKLAHOMA DISTRICT

During the past year the promising lead and zinc-mining town of Picher has risen out of the grain and hay fields in the northeastern corner of Oklahoma some 10 miles nearer the border than Miami. Already the place boasts a railway, a hundred or more one-story frame dwellings and store buildings, a population of about 500 persons and a hard-surfaced motor road most of the way to Joplin, Mo., making communication with that city a matter of an hour's drive. In addition, there is a large concentrating plant equipped with thoroughly modern machinery. Plans are also being made by a Missouri traction company to extend its interurban lines to the point, while a second railroad is said to have purchased a right of way to Picher. The community has changed rapidly from a quiet agricultural one to a busy, excited mining district. Where smoke but a short while ago curled from the stacks of threshing engines, drilling rigs—probably 150 of them—now puff away constantly.

The story of Picher is typical of those of many other southwestern towns in the oil and ore belts. The first drilling was started in the fall of 1914. Deposits of ore were found in loose, open ground of blue and brown flint composition. It was soon after this that extensive preparations were made for the development of the field. On 12 sections of land lying between Picher and Commerce, 28 mills are in operation. The average capacity of

Seven Out of Eight Holes Sunk in This 40-Acre Tract Uncovered Ore. Enough has been Mined to Keep a Fair-Sized Mill Busy Two Years

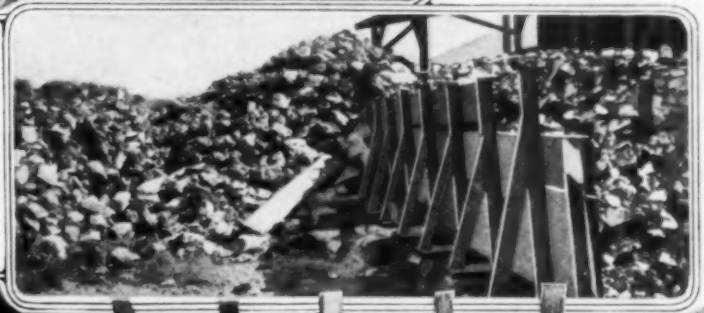
Each of These Rigs is Working a Separate Holding. In the Background is Shown One of the New Mills That has Lately been Erected

These Two Piles of Lead and Zinc Ore are Valued at About $24,000. The Mine is Located near Picher, Oklahoma, on 40 Acres of Ground Leased from the Owner for $5,000, and is Giving Up "Jack" That Assays About 40 Per Cent

Forcing Air under Pressure into Drilled Holes in Order to Force Water, with Which to Run the Power Plant, to the Surface. During the Final Week in June, Last Year, 300,910 Pounds of Lead were Shipped from This Mining Property, Which has Been in Operation Only a Short Time

Where the Mining Interests are Gradually Forcing the Farmer into the Background. Here Five Drills are Working in an 80-Acre Field. Promising Mines and Busy Mills Surround This Tract

Piles of Very Rich Ore Taken from One of the Picher District Mines, Awaiting the Erection of a New Power Mill. It Is Not Unusual to Find Lumps of Pure Metal and the Heaps Shown Here Contain Many Such



Samples of Earth, Rock, and Ore from One of the Bores: Specimens are Taken Every Five Feet as the Drilling Progresses, and Marked with Paddles on Which the Depths are Recorded. When Traces of Ore are Struck, Samples are Taken Every Three Feet

these is about 250 tons for a 12-hour shift. Shallow ore has been mined at a depth ranging from 92 to 100 ft. at one mine in the Picher district, while drillings have disclosed a lower run between 180 and 200 feet.

AMERICAN CLOCK GIVEN TO JAPAN'S HEIR APPARENT

Among the many beautiful presents received by the royal family of Japan on the occasion of the recent coronation, is a clock given by residents of Washington, Montana, and Alaska, and built according to the order of the Japanese Association of North America. The clock stands 4 ft. 9 in. high, and has four sterling-silver dials. Its frame is made of steel, the ornamentation of bronze, and three of the panels in the standard are of onyx. A fourth panel is of beveled glass, through which practically all the mechanism can be seen. The four dials show, respectively, the time at Tokyo, Puget Sound, New York, and Greenwich. Surmounting the timepiece is a globe which makes one revolution every 24 hours. The sun's position in relation to the earth is indicated by a gilded ball mounted at one side of the globe. The clock was made in Seattle, and its works are operated by weights. It was a gift to the heir apparent and accompanied costly gifts to the emperor and empress.

ZEPPELIN RAIDERS FACE PERIL FROM OWN CRAFT

It is not generally recognized that besides the dangers which fire from the enemy subjects Zeppelin raiders to, there is extreme hardship to be endured and also a grave peril which is inherent in the dirigible itself because of the high altitude at which it must fly. From a recently published interview with a Zeppelin commander it appears that the German people have been complaining that the dirigibles have been inactive. The officer indignantly declares that if the dissatisfied ones could be made to share in just one raid, their complaints would never be renewed. "At the great altitude necessary," says this commander, "the cold is so severe that the men are covered with icicles. The danger is great, for, apart from the shells, the rareness of the air causes it to penetrate into the gas holders, with the consequence that the hydrogen and oxygen form an explosive gas mixture which catches fire from the least spark." "For this reason," the commander adds, "the men have to wear felt boots, as nailed boots might draw a spark by touching some metal object in the gondola. It is almost impossible to send the same crew on two successive expeditions, for their nerves will not stand it."

NOVEL MEANS USED TO PUT OUT RAILWAY-BRIDGE FIRE

A railway engineer in New Brunswick was commended recently for his quick wit in employing unusual means to put out a fire that he discovered burning the ties of a railway bridge over which he was driving a train. After stopping the train he moved the locomotive so that its ash pan stood directly over the blazing ties. He then flooded the pan with water from the ejector. As it trickled down from the pan it put out the blaze, and what might have proven a serious loss was averted. On reaching the next station, a man was sent back to see that the fire had not started up again.

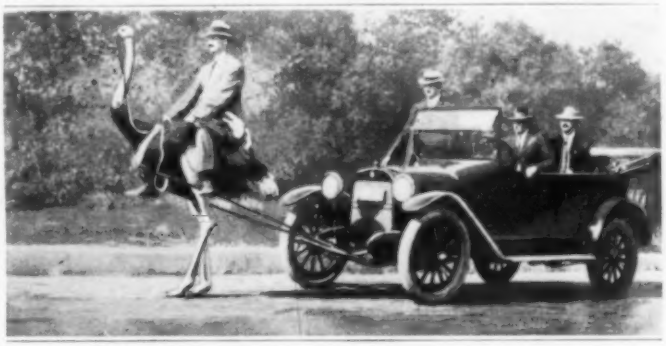
COPYRIGHT, UNDERWOOD & UNDERWOOD

CARS TELESCOPE EACH OTHER IN ODD MANNER

ABOVE is a view taken shortly after a collision between two New York subway trains on the elevated structure near a tunnel entrance. The accident occurred when a train, traveling at a rapid rate, crashed into an empty three-car train that was not moving. In spite of the violence of the impact the side walls of the foremost of the moving cars remained practically intact. It rode up on top of the rear car of the standing train, its side walls spreading out slightly and enveloping the car beneath it. The motorman driving the moving train is said to have jumped to safety. Thirteen persons were injured. This accident happened some weeks ago, but this picture, which was crowded out of our December issue, is well worth studying.

OSTRICH DRAWS MOTOR CAR AND CARRIES TRAINER

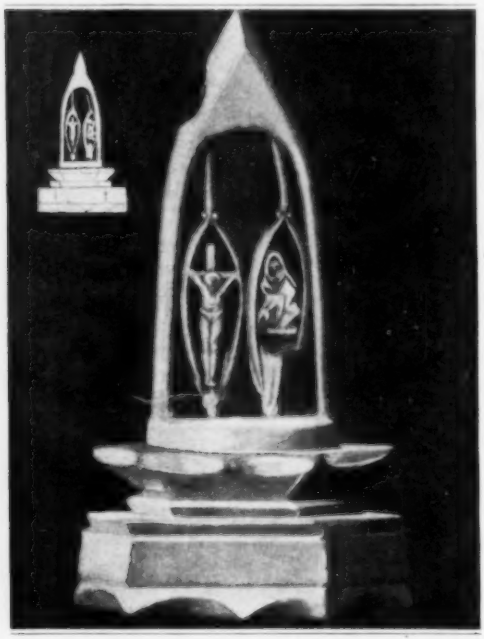
For the purpose of deciding a wager regarding the strength of an ostrich, a bird from a California ostrich farm was harnessed to an automobile to see if it was able to pull so heavy a load. About its neck and breast was placed an ingenious harness which was hitched to the axle of a medium-sized car. In the first trials the trainer, who rode on the back of the bird, kept a sack over its head and the creature refused to pull. But when the sack was removed it strained at the harness and soon was pulling the automobile along the boulevard, up a slight grade. The bird did not stop until commanded.



Ostrich Demonstrating Its Strength by Carrying Its Trainer and Drawing an Automobile up a Slight Grade

MINUTE IMAGES ARE PLACED IN TINY CARVED SHRINE

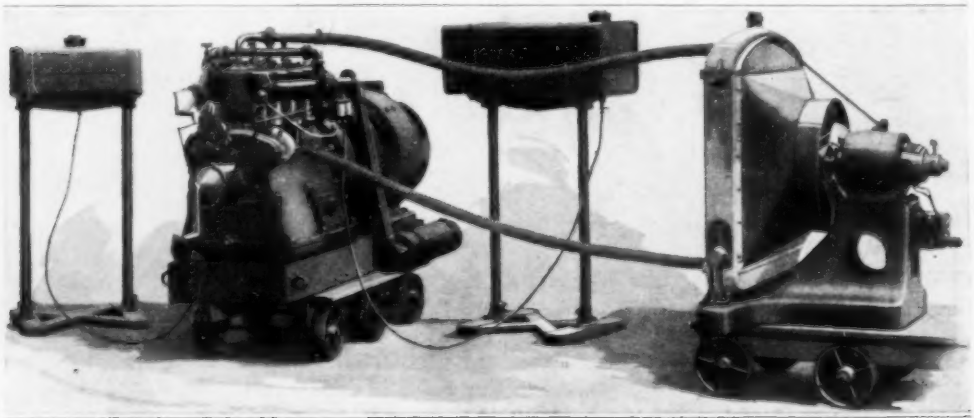
Japanese miniature carvings are always interesting to those who enjoy the clever handiwork of the deft Oriental artisans. An odd specimen of some of this craftsmanship is a cheap little pocket shrine, no larger than a watch charm, that, with other curios, has made its way across the Pacific. Miniature images of the Crucifixion and the Virgin and Child are held in two rice hulls supported in a tiny altar carved from some light wood. The figures themselves are only about an eighth of an inch in height and their details are not distinguishable except when magnified. A small capsulelike case fits over the trinket, protecting it and inclosing all but the base.



An Actual-Size Picture of the Handiwork, and an Enlargement Which Shows the Details

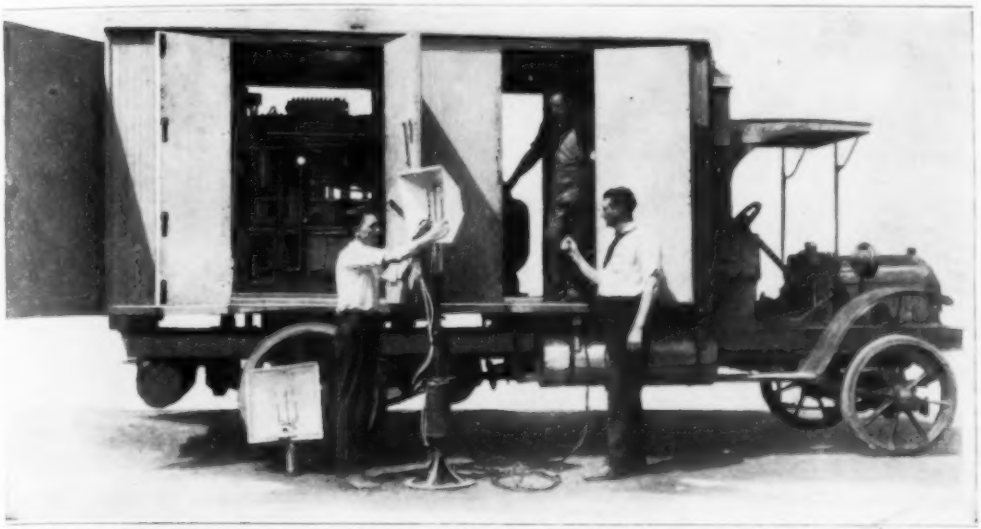
PORTABLE GENERATING SET MADE FOR ENGLISH ARMY

Portable generating sets of a type particularly suited for field conditions have been installed at many of the machine shops of the British army at the front. The unit develops current for both power and lighting purposes and is of simple design and stanch construction. An 18-kw. dynamo is driven by a four-cylinder, water-cooled motor-car engine which is controlled by a governor. The motor is started with gasoline, but when it has become warm, kerosene is used as fuel, the latter being vaporized with the heat given off by the exhaust manifold. The water circulates through a standard motor-car radiator and is conducted to and from the cylinders through wire-bound hose. A special motor operates the radiator fan, which is inclosed. Directly coupled with the engine is the dynamo, and the two members are



COURTESY OF ELECTRICAL REVIEW AND WESTERN ELECTRICIAN

The Plant is Arranged so That It may be Quickly Assembled after being Transported to a New Position



This Portable Lighting Plant Facilitates the Filming of Movie Dramas, Staged in Remote Sections Away from Electric-Transmission Lines

mounted on the same truck, while a separate bed is provided for the radiator and its motor. Two fuel tanks, one containing gasoline and the other kerosene, are held on standards.

AERO STATION FOR HAWAII PLANNED

The commander of the government's forces in Hawaii has sent a request to the War Department for 24 biplanes, with a view to establishing an aviation corps in that island territory. If the officer's plan, which is the result of a careful investigation, is carried out, it will mean that Hawaii will have one of the largest aerial research stations maintained by the United States. In operating it the Weather Bureau will coöperate with the military authorities, according to the plan. In connection with the establishment of this station an effort will be made to organize an aero club with the support of business and professional men of Hawaii. Such a club would be a great help in strengthening the aerial branch of the island's defenses.

¶Oak is considered the most suitable wood for carving on account of being tough and durable, but not too hard.

MOVIE LIGHTING APPARATUS CARRIED BY MOTOR TRUCK

One of the eastern moving-picture producing companies has developed a mobile lighting equipment which overcomes one of the greatest handicaps commonly encountered in filming photoplays outside of a studio. The outfit consists of an electric generating plant mounted on a large covered motor truck. The body of the van is divided into two compartments. In the rear one a 50-hp. gasoline engine has been installed. This drives a dynamo located in the forward compartment. The interior of the housing is lined with sheet metal, as protection against fire, while the floor is covered with rubber insulating mats. With this equipment it is possible to go into remote rural or mountain sections, away from electric-transmission lines, and do satisfactory photographic work without much difficulty. A battery of mercury-arc or nitrogen-filled incandescent lamps mounted on standards and fitted with studio reflectors can be set up in a few minutes and connected with the lighting circuit. In this way interiors can be taken anywhere, and outdoor scenes filmed at night.

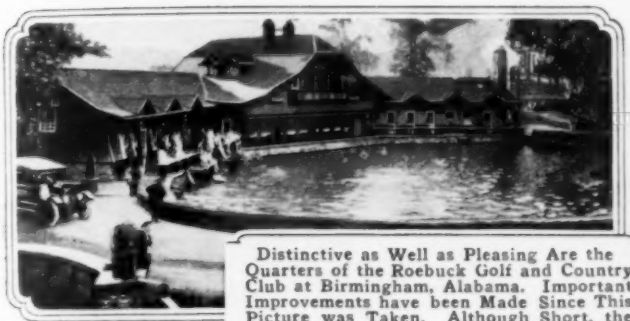
AMERICA'S ATTRACTIVE COUNTRY CLUBHOUSES

The Airy, Inviting Little Home of the Phoenix, Arizona, Country Club is Pictured at the Left. On the Hill Back of the Tree Shown in the Illustration Above Is the Fifth Tee of the Nine-Hole Course. The Canal Which It Overlooks is Crossed Three Times and Catches the Balls of Many Unwary Golfers

Hospitable Seat of the Oleander Country Club, Situated near Galveston, and the Scene of Many Charming Affairs. The Tee for the Sixth Hole on This Course is Pictured Below at the Left. It Is a Short, but Difficult, Hole Because Two Large Trees Stand in the Fairway Directly in Line with the Green, and 40 Yards from the Tee

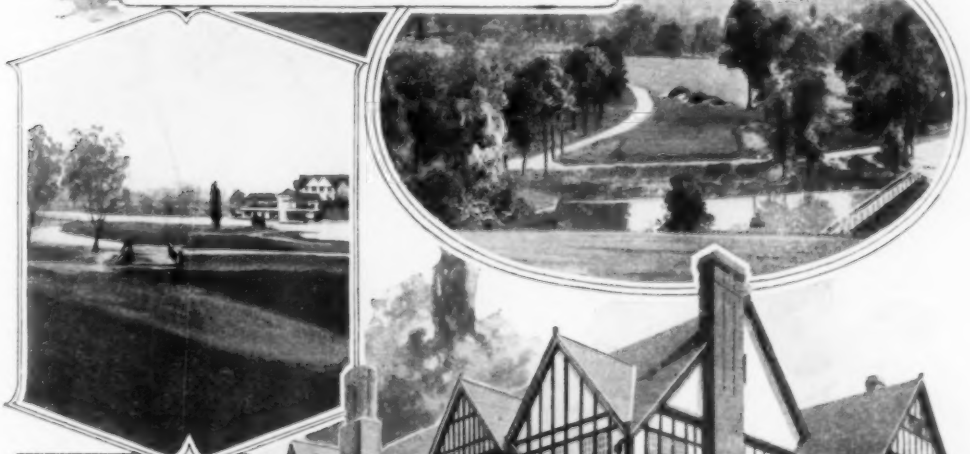
A Homelike, Restful Atmosphere Pervades the Residential Quarters of the Druid Hills Golf Club at Atlanta, Shown at the Left. Above Is an Interesting Stretch on the Links. Woods on One Side and a Winding Creek on the Other Make a Clean, Straight Drive Imperative in Playing the Seventh Hole

AND SOME OF ITS BEST-KNOWN GOLF COURSES



Distinctive as Well as Pleasing Are the Quarters of the Roebuck Golf and Country Club at Birmingham, Alabama. Important Improvements have been Made Since This Picture was Taken. Although Short, the Third Hole on This Course is Considered the Most Difficult

Vine-Covered Plaster Home of the Birmingham, Alabama, Country Club, Situated on One of the Many Hills Surrounding the Golf Course. The Eighth Hole is Pictured Below at the Right. A Drive of 130 Yards, if Straight, will Clear the Water. The Green Slopes and is Surrounded by a Sand Trap, Making the Approach Difficult



New Country Establishment of Atlanta Athletic Club. A Splendid Course, Crossing and Recrossing a Small Lake, Encircles the Building. Pictured Above Is the Island Hole, a Particularly Hard One. The Green is Situated on Ground 60 by 30 Yards in Size and Surrounded by Water. The Distance Is 165 Yards

PLEASING EFFECTS GIVEN BY NEW METAL WINDOW

Attractive features are incorporated in a new type of window that has lately been adopted by several prominent architects for installation in buildings and residences in different states. It is of metal construction, has successfully passed the tests of fire underwriters, and shown itself to be dust-proof, water-tight, and air-tight. In appearance it is very similar to a certain form of casement window, but does not properly come within this classification, according to the inventor. It is divided vertically into two equal sections which are held together by a brass hinge that extends the full height of the window. These members are supported at the top and bottom by steel arms extended from a stationary upright placed in the center of the frame, and operate simultaneously. Pulleys, weights, chains, and gearing are absent, and a slight outward pressure, or an easy pull, is sufficient for opening and closing. The operation is practically noiseless, both surfaces of the glass can be washed from the inside of a room, and, by means of a simple arrangement, a screen may be mounted on the interior without interference. The window may be opened to any degree and locked securely so that it will not rattle.

At the Left is Shown an Interior View of the Window Partly Open; in the Middle, the Lighting and Ventilating Advantages Gained by Grouping Several of Them, and at the Right the Simple Way in Which Both Surfaces of a Pane can be Cleaned from the Inside

CARD-FILING DEVICE BUILT LIKE A MERRY-GO-ROUND

A revolving card-filing device, which bears some resemblance to a miniature merry-go-round, has been devised for the convenience of a bookkeeper in a large Denver dry-goods store. It consists of a circular platform, pivoted at the center and supported at its edges by small rubber-tired, ball-bearing wheels. On the platform 24 filing cases are arranged in two circles, one within the other, the inner circle being raised a few inches higher than the outer one. The platform is located beside the bookkeeper's desk and by merely turning it about any one of the hundreds of cards can be brought within easy reach, without the user rising from his chair. Figures are placed conspicuously on the side of each filing case to assist in finding the one desired as quickly as possible.

A Card-Filing Device Which Places Hundreds of Cards within Easy Reach of the Person at the Desk

MARKING BOUNDARIES OF NATIONAL FORESTS

The placing and maintaining of the boundary markings of the national forests is one of the tasks of the forest rangers which often prove arduous. The Forest Service requires that signs with proper descriptions shall be posted at all section corners, and at in-

A Forest Ranger, with His Camp Outfit, on a Boundary-Marking Expedition

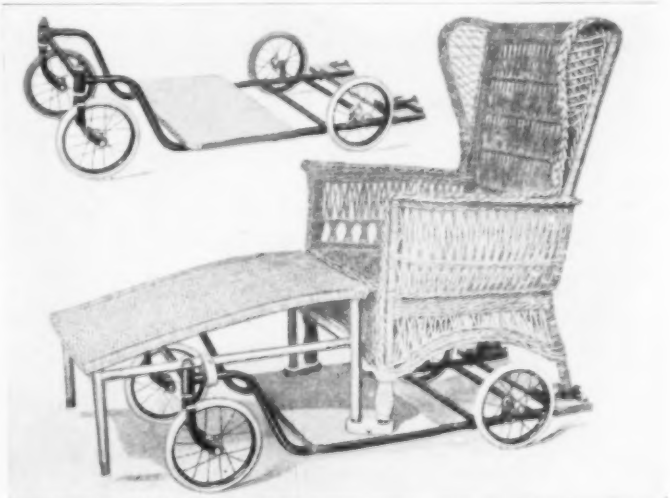
At the End of the Day's Tramp a Camp is Made in the Forest

One of the Boundary Signs Erected by the National Forest Rangers

tersections with trails, roads, streams, and ridges. Each notice must face outward, that is, from the forest. Where there is no timber to which signs can be fastened, posts must be set to show the boundary. The total distance around the various parks ranges from 150 to 300 miles, according to the size of the reserved area. One ranger's share of a park means that he has from 30 to 60 miles of boundary to keep marked, a task involving long tramps. In the winter, while engaged in this work, he often packs his entire equipment on a hand-made sled and hauls it with him as he goes from point to point. At night he camps in some convenient spot, shoveling away the snow to make a place for his tent, while the snowshoes, skis, etc., are placed within easy reach, preparatory to resuming the journey.

COMBINATION WHEEL AND FIRESIDE CHAIR

A low four-wheel truck having a steel frame is a useful accessory for the home where there is an invalid. It has been devised to be used in connection with a fireside reed chair so that the latter can serve also as a wheel chair. The truck's wheels are 10 in. in diameter and rubber-tired. The forks of the two forward ones are pivoted to the truck so that it can be steered in any direction. When the wicker seat is placed on the truck for the purpose of wheeling it about, the back legs rest in sockets that keep it from slipping off, and the front legs on a wide platform. A leg rest, made to match the reed work, can be clamped over the front wheels and platform, thus making a portable steamer chair. If desired, the chair can be used without the truck or leg rest, or with the latter alone.



A Wheel Chair Which with Its Separate Leg Rest can be Removed from Its Steel-Frame Truck, so That It can Serve as a Fireside or Steamer Chair

COSTLY JACKETS ADORNED WITH ELK TEETH

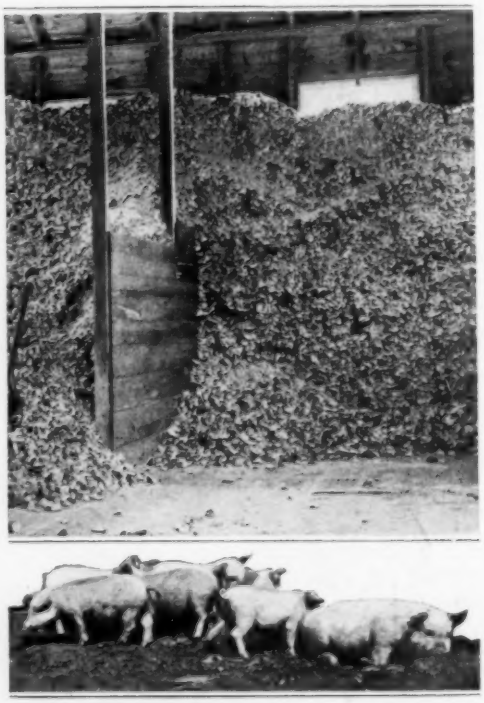
Elk teeth, now commonly worn as an emblem of a large fraternal order,

Nez Percé Squaw Dressed in Festal Garb Which is Adorned with 150 Elk Teeth

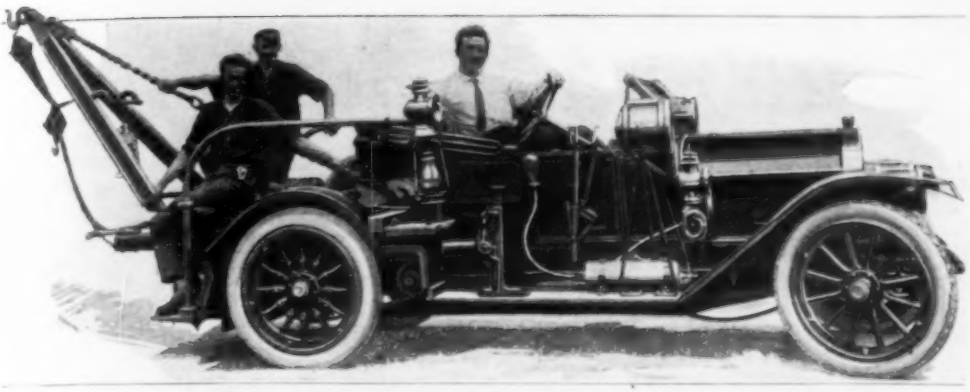
have long been prized as articles of adornment by certain Indian tribes. The Nez Percé squaws, for example, use them extensively in decorating their jackets, hanging them in festoons about their shoulders and sewing them to the fabric. Garments decorated in this manner are worn by these Indian women at the annual round-up of the tribe at Pendleton, Wash., and on other festal occasions. A well-shaped elk tooth is worth as high as $12. Each year these teeth are becoming less plentiful, because the elks are more scarce and the laws designed to conserve them are more strict. Indian jackets adorned with these unusual decorations range in price from $500 to $2,000. Some of the garments are almost covered with the trophies. The one shown has about 150 teeth.

STALE BREAD CHEAPER THAN MEAL FOR STOCK

Stale bread is now being used in various forms as a food for stock and poultry, the demand for it being very strong because at the present time it is less expensive than meal. In some cases it is fed to animals with skimmed milk, and in others it serves as a base for some brand of stock food. The bread utilized for these purposes is what is returned unsold by the retail dealers to the bakeries. The bakers take these stale loaves and break them up and dry them for several days on the tops of ovens. The dried pieces are then put in bags and sold by carload lots. On a large farm near Pittsford, Vt., about 100 very fine hogs are raised for market each year. These animals are fed largely on stale bread and skimmed milk, the bread being shipped, tons at a time, from New York City.



Above Is a Partial View of a Bin on a Farm near Pittsford, Vermont, Containing Several Tons of Dried Stale Bread, Which Is a Principal Article of Food for 100 Pigs. A Few of the Animals Are Shown Below



A 50-Horsepower Car Equipped with a Wrecking Outfit That Includes Jacks, Ropes, Tow Wheels, a Powerful Crane, and Extra Lights for Working at Night

POWERFUL AUTO-WRECKING OUTFIT ON REAR OF CAR

An automobile-wrecking outfit has been constructed by a concern in Greenwich, Conn., which takes up comparatively small space and is powerful and efficient. It occupies the rear of a 50-hp. car and is composed of all the apparatus necessary to right and transport cars that are disabled or have been overturned into a ditch. The equipment includes a tow cart, tow wheels, a powerful crane, bars, ropes, jacks, and extra lights for working at night. The crane is fastened to the rear of the auto body and is supported by a heavy chain, which is attached just in front of one of the rear wheels. A rear step and handrails are provided for the convenience of the crew riding with the outfit.

RADIATORS FORM BORDERS AROUND WINDOWS

A large number of iron radiators such as are necessary to heat a spacious hall or auditorium often add an inharmonious element to an interior which is otherwise very artistic, and they also take up valuable space. These undesirable features have been overcome in planning a Masonic hall in La Grange, Ill., by arranging the radiators around the sides of large windows. The recessed areas, the centers of which are occupied by the windows, are perhaps 12 ft. high and 6 in. deep, so that the radiators which form a border for each, do not project out into the room but stand about even with the wall. This arrangement has not interfered with the heating of the hall, and the general effect from an artistic standpoint is rather pleasing.

Radiators Arranged in an Artistic Manner about Recessed Windows of a Lodge Hall so That They do Not Take Up Floor Space

NEW FERRY CARRIES MOTOR CARS ON SAN PABLO BAY

Increasing traffic on San Pablo Bay between the Marin and East Bay shores, in California, has been responsible for the construction of a large ferry especially designed for the accommodation of motor cars and other vehicles. Until a number of months ago such service was not provided, and as a result the route was an inaccessible one to automobile tourists. After an antiquated vessel had been employed for a short time, however, the need of first-class facilities became apparent, and the new ferry was built. The boat is a double-ended one of the side-wheel type with rudders at either stem. The machinery is mounted in the middle of the main deck and compactly housed so that ample space is provided for four lines of vehicles and a three-foot passageway. The upper deck is margined by a 12-ft. promenade, while the housing in the middle of it is divided into a saloon for ladies, smoking rooms, a grill, and other compartments. In over-all length the ferry is 169 ft., and is able to accommodate about 50 motor cars and 500 passengers. It will make two trips an hour over a route that is slightly more than three miles long.

The Motor-Car Ferryboat Leaving the Ways at Benicia, California, Where It Was Constructed

RUSSIA'S VAST FORESTED LANDS BARELY TOUCHED

Russia is said to stand first among the nations of the world in the extent of its timber resources, possessing such vast areas of forested lands that even the value and quality of many of them have not been ascertained. So great are the figures relating to these tree-covered regions in the north of Europe and Asia that the mind cannot fully grasp them. For example, it is estimated that in European Russia, Finland, Poland, and the Caucasus there are 549,000,000 acres of forested lands, and that in western Siberia there are 465,000,000 acres. In European Russia the government owns 285,000,000 acres, and 360,000,000 acres in Asiatic Russia. Other holdings bring the total number of acres of forest owned by the government to almost a billion. It is reported that two large companies are being organized in Russia to engage in exporting lumber, and that they will compete in American markets.

COPYRIGHT, INTERNATIONAL FILM SERVICE

STRANGE SETTING FOR FUNERAL PROCESSION

PERHAPS never before has a funeral procession had such an oddly arranged setting as that presented in the above picture. Silent, almost motionless, policemen line the railway viaduct under which the hearse and carriages are passing on their way to the cemetery. The funeral is that of a woman in Bayonne, N. J., who, while watching the police quell a strike disturbance, was accidentally shot. The unusual guard shown here, together with another stationed about the bereaved home, was established to prevent any disorderly demonstration during the funeral.

ROOF OF FOREST SHELTER MADE FROM HOLLOW LOG

Up on the side of Mt. Baker, within 50 yd. of the Roosevelt glacier, is a shelter of unusual design, erected for the convenience of forest rangers, hunters, and others. The novel feature of this roughly built structure is the roof. When the forest rangers were building it they found no timber in the vicinity suitable for splitting up into shakes or shingles. However, the discovery of a large hollow tree solved their problem. It was cut to proper lengths and then split into sections, which were placed so that their edges overlapped. Alternate sections were laid with the hollow side up, so that they served as troughs to carry off the water. A fireplace in front of the shelter furnished a safe place for building a campfire. This hut, like the others built by the rangers, is located within easy reach of an abundance of fuel and pure water.

Campers' Shelter on the Side of Mount Baker, Having a Roof Made from a Large Hollow Tree

STRATEGIC RAILWAY LINES BEING BUILT IN AFRICA

Instead of being a hindrance the war has been a great stimulus to the building of railways in many parts of Africa, especially in those regions

Preparing to Build a Temporary Military Bridge across a Stream in Western Africa: The Ropeway Serves for Transporting both Men and Materials

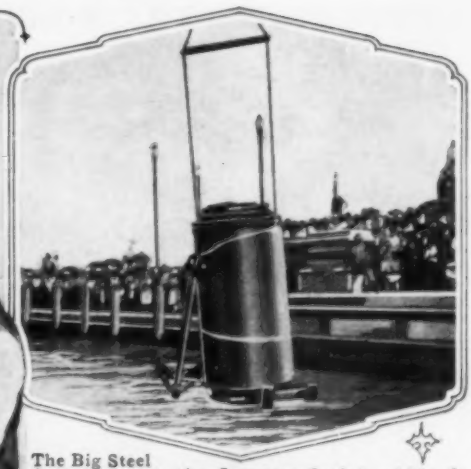
where railroad lines have been needed for military purposes. In the campaign against German Kamerun the British, in Nigeria, have been especially active in railway building. Several hundred miles of temporary track have been laid with a view to the strategic advantage to be gained. Later it will be made permanent. The accompanying illustration shows preparations which have been made for building a temporary bridge across the Sewa River, a tributary of the Niger.

FLOATING VAULTS DESIGNED FOR OCEAN STEAMSHIPS

As a means of preventing registered mail and valuable articles owned by passengers from being lost when a steamship founders, two Italian inventors at Chicago have developed a system of floating safes for installation in ocean liners. The arrangement consists in part of a large, cylindrical steel casing placed vertically in the middle of a ship, the top flush with the upper deck and covered with a loose-fitting, easily lifted cap. The bottom of the well is closed by a concave head of considerable strength. Within the shaft is a perforated shell of considerably less diameter. In the lower part of the inner casing there is a hermetically sealed float. This bears the name of the vessel and is attached to one end of a flexible cable wound about a reel. Arranged above this is a series of nonsinkable vaults. Doors are provided in both the outer and inner casings at the various decks so that ready access is gained to the safes. Should a ship, thus equipped, sink, water would enter the well and cause the floating vaults to shoot out of the tube and rise to the surface, according to the inventors. The purpose of the float in the bottom of the shaft, which has the cable attached, is to serve as a marker, indicating the position of the wreck and identifying it. To demonstrate that the system would work if put to the test, one of the builders recently allowed himself to be locked inside one of the floating safes. This was held in a double casing, of the kind just described, and dropped off a raft into Lake Michigan. Scrap iron and a large anchor were secured about the outer steel cylinder to cause it to sink to the bottom. In 80 seconds the safe reached the surface, shooting about five feet into the air. A moment later the man was liberated.

¶It has been proposed to construct a canal from the White Sea, through Russian Lapland and Finland, to the Gulf of Bothnia, a distance of 186 miles.

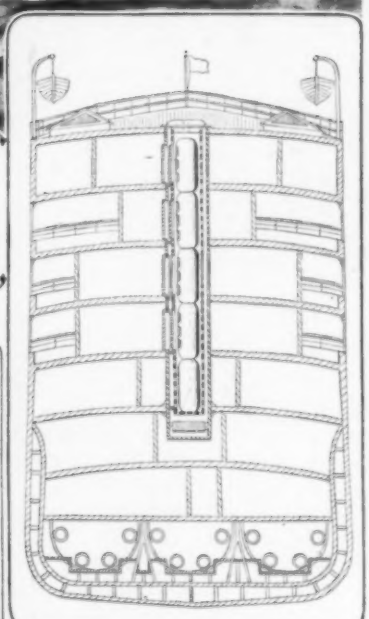
Making Ready for the Spectacular Test of the New Floating Vault, Which has been Designed for Installation in Ocean Liners. The Inventor is Shown Taking His Place within the Safe, Which was Subsequently Sealed and Dropped into Lake Michigan



The Big Steel Cylinder, with the Inventor Sealed within It, being Swung Free from a Raft and Plunged into the Water before Hundreds of Spectators at Chicago

The Vault is Intended as a Nonsinkable Depository for Registered Mail, Jewels, and Valuable Articles Owned by Steamer Passengers. The Illustration Shows What would Happen if a Ship So Equipped should Founder

Eighty Seconds After the Big Cylinder Disappeared from Sight, the Vault Contained within It Shot to the Surface. It was Opened and the Man Liberated While Crowds Cheered



Cross Section of Ship Showing Central Shaft in Which the Separate Vaults are Carried. Doors in the Casings at Various Decks Give Access to Safes

HEAVY PICTURESQUE CARTS USED ON CUBAN ESTATES

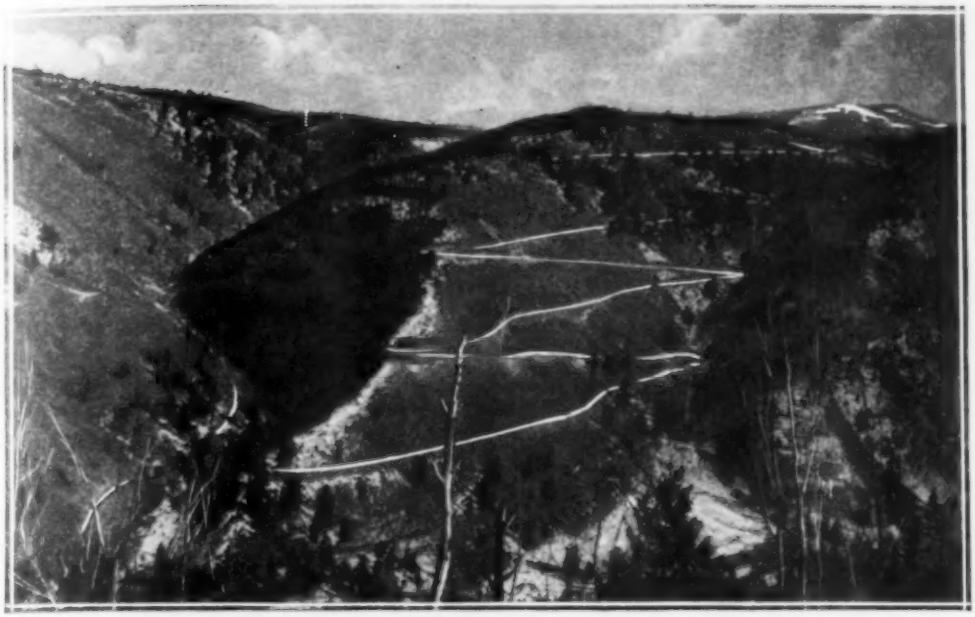
In many respects the Cuban plantations are quite up-to-date, but some of them still retain picturesque reminders of less progressive days, as, for example, the huge lumbering carts used to haul loads of sugar cane, and other products. As the accompanying illustration shows, these two-wheel vehicles are very heavily and rather crudely built. Six oxen are used to haul this cart, the driver walking along beside the beasts. The load consists in this case of sugar cane and weighs about 300 lb. The oxen are able to draw it at the rate of a mile an hour.

A Cart on a Cuban Sugar Plantation Loaded with 300 Pounds of Sugar Cane and Drawn by Six Oxen at a Rate of About a Mile an Hour

NEW DUMP CAR DEPOSITS LOAD CLEAR OF TRACK

Great economy of labor and time are effected by the use of a new street-railway dumping car, which has a tilting body that can be moved to one side or the other about 3 ft. before discharging its load. This feature makes it possible to dump a load several inches outside the rails. The car, which has a capacity of 18 cu. yd., is built low, the tops of the sides being only 5 ft. 4 in. above the track. Three-fourths of the load can be shoveled in with the sides drawn up, and since the floor of the car is only 3½ ft. above the rails, the labor of loading is lessened considerably. After the doors have been closed the body can be tilted so as to make it easier to shovel on additional material. The body is divided into three compartments so that part, or all, of the load can be dumped in one place, or may be strewn along beside the track by tilting the body while the car moves along slowly. A good feature of the dumping mechanism is that it gives the motorman complete con-

Dump Car Having an Electrically Operated Body Which Moves to One Side before Dumping, so as to Leave the Track Clear. The Capacity of This Dump Car Is 18 Cubic Yards. Safety and Efficiency are Promoted by the Fact That the Tilting Body Is Always under Full Control of the Motorman



This New Government Road in Taos County, New Mexico, with a Maximum Grade of Seven and a Half Per Cent, Replaces an Old One Nearly Four Times as Steep

trol of the body, no matter at what angle it is tilted. This mechanism is operated from one end of the car where is situated a reversing switch which governs a motor. The latter supplies power by which the body is rolled to either side and tilted before the doors are unlocked.

GOVERNMENT ROAD CROSSES RED RIVER PASS

On the Red River section of the Questa-Elizabethtown road in Taos County, New Mexico, the Forest Service has surmounted many difficulties and completed the construction of an interesting, scenically beautiful mountain highway. The problem encountered was that of overcoming an 1,100-ft. elevation in a very short distance. It was accomplished by building a series of switchbacks, connected by hairpin turns, up the face of the mountain. This was done on the south slope in order that the artery might not be blocked by the heavy snows that bank the north side of the range in winter. In view of the fact that the incline amounts to more than a foot for every 30 in., the yardage of earth to be removed was great and the handling of teams rendered difficult. The new road has a maximum gradient of seven and a half per cent, as compared with the 28 per cent of the former one, which extended through the cañon shown at the left in the accompanying picture. The road is about three and a half miles in length and cost slightly less than $5,000 a mile.

MODERATELY PRICED WATCH OF CALENDAR TYPE

For those who care for novelty watches, a low-priced instrument fitted with an eight-day movement is being introduced that has some interesting features. In addition merely to indicating the time in terms of seconds, minutes, and hours, it serves as a calendar, showing the days of the week and month. Three dials are arranged on its face, the largest being like that of an ordinary watch except that it bears split-second graduations and is

equipped with a continuous-sweep second hand. Two small dials are arranged on either side at the bottom of this, one marked with the days of the

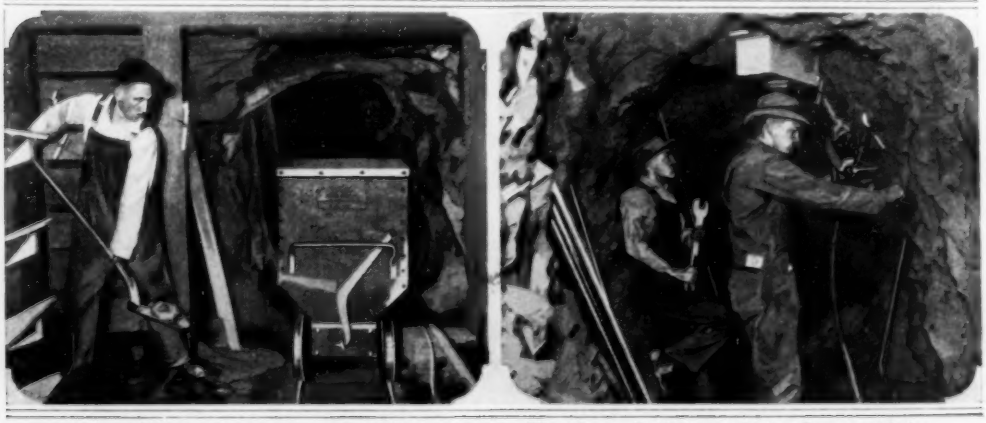
Time in Terms of the Days of the Month and Week, and Hours, Minutes, and Seconds of the Day, are Shown

week and the other with the numerals for the days of the month. The instrument is built with an open escapement and provided with an open-face case of either gun metal or nickel.

¶What is said to be the largest irrigated farm in the country is located in Kansas and contains 50,000 acres.

PRACTICE TUNNEL IS BORED BENEATH COLLEGE CAMPUS

Without having even to leave the campus, mining students enrolled at the University of California are obtaining practical first-hand experience in subterranean engineering. A bore has been started in a hillside adjoining the mining building, and in carrying out the work the novices gain much of the same training that they would receive in a real mine. Already the adit has been driven more than 100 ft., and according to present expectations the tunnel will eventually be extended several thousand feet in different directions. The student operators devote a certain number of hours each week to work in the tunnel, and this is just as much a part of their course as is laboratory or lecture-hall attendance. Leaving their classrooms they don overalls, work shirts, and heavy shoes and enter the bore to do their tasks, drilling, blasting, shoveling, filling the cars with rock and clay, riding them to the dump, and timbering the bore as conditions require. It is possible that an underground chamber will be constructed and in the future used as a mineralogical laboratory. It is also expected that when the drift has been carried some distance, water will be reached. Should this be the case, and the supply large, it will be made use of by the university.



Student Miners Getting First-Hand Experience by Working a Drift beneath the Campus of the University of California

OPEN OLD BROMINE WELLS TO RELIEVE SHORTAGE

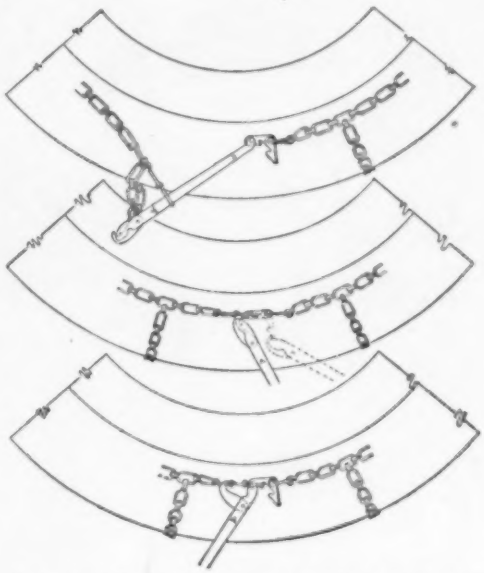
The shortage of bromine, which both the photographic trade and the medical profession have felt for some time, promises to be relieved, in part at least, by the reopening of bromine wells in Pomeroy, Ohio, and Mason City, W. Va., which have been idle for several years. Their monthly output at present will amount to about five or six tons and it is predicted that within a few months American manufacturers of bromides will be able to meet the normal domestic demand. During the years 1911 to 1914 the average production of bromine in this country was 306 tons. While the importation of this chemical from Europe has never been large, before the war there was a heavy importation of photographic paper from Germany. When the war curtailed these shipments the bromine market necessarily was seriously affected, because this chemical is used extensively in making such paper.

RULE REQUIRES POWERFUL HEADLIGHTS ON ENGINES

After a discussion by railroad interests, which has lasted several years, the Interstate Commerce Commission has ordered that all railroad locomotives in road service shall be equipped with headlights which will be strong enough to enable a person in the engine cab to see a dark object the size of a man, a distance of 1,000 ft. ahead of the engine. Labor organizations have strongly favored such a rule and certain roads, chiefly some in the West, already use electric headlights powerful enough to conform to it. On the other hand many operating chiefs have strongly opposed the regulation on the ground that the glare produced by powerful headlights obscures the signal lights and confuses the engineer. The estimated cost to the railroads of the country for new equipment under the new rule is $6,000,000, not including the labor or expense of making the change.

COMBINATION TIRE-CHAIN TOOL

A combination tool with which one can apply or remove automobile-tire chains consists of a bar slightly hooked at each end and having an additional

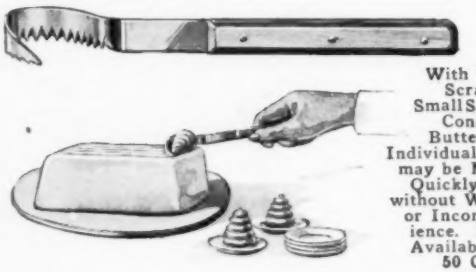


A Hooked Tool Which can be Used as a Lever to Draw the Ends of a Tire Chain Together and as an Aid in Unlocking and Loosening Chains

hook pivotally fastened to its side close to one end. After a chain has been put around a tire and the slack taken up by fastening it on the inner side, the tool is inserted through the unattached end link and then hooked to the first notch of the chain's locking member. The bar can then be used as a lever to draw these two ends together, after which they can be locked easily. The tool can also be used advantageously to pry open the locking device, and to loosen the chain if it is too tight. It occupies very little space in a tool box.

¶Wealthy Chinese are reported to have acquired a fashionable old residence in Chicago, which they will fit up in luxurious Chinese style, making it over into apartments that promise to fascinate those who share in the present fad for things Chinese.

SOME NOVEL AND LITTLE-KNOWN ACCESSORIES

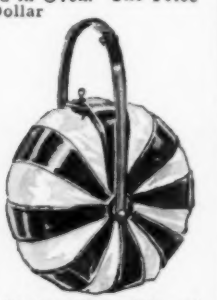


With This Scraper, Small Spiral Cones of Butter for Individual Use may be Made Quickly and without Waste or Inconvenience. It Is Available at 50 Cents

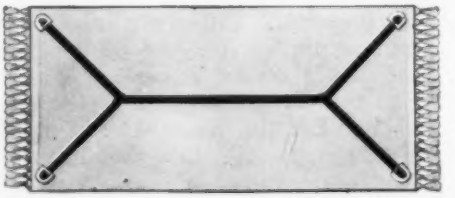
Rolled Dough is Laid on the Tray and the Biscuits Left in Place as They are Cut. The Scrap Strips are Removed and the Pan Placed in Oven. The Price Is One Dollar

For the Housewife Who Prepares Her Own Catsup and Grape Juice, This Bottle Capper, Costing $2.75, Proves Very Convenient

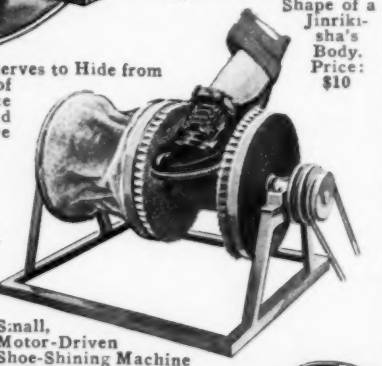
This Decorated Wooden Figure Serves to Hide from View a Telephone Instrument of the Desk Type. The Mouthpiece Projects through a Hole Provided for It. The Device Is Inexpensive



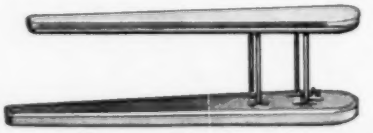
Made of Tan Silk and Patent Leather, This Novel Hand Bag is so Designed That When Opened It Assumes the Shape of a Jinrikisha's Body. Price: $10



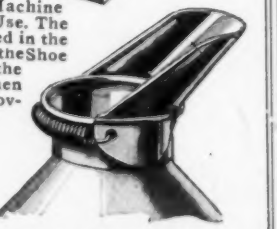
Small Rugs can be Made to Lie Perfectly Flat at All Times by Using Steel Holders of This Type Which Fit into Leather Pockets Sewed to the Corners on the Under Side



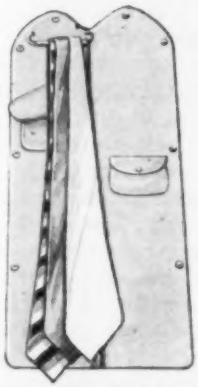
Small, Motor-Driven Shoe-Shining Machine for Household Use. The Polish is Applied in the Usual Way and the Shoe Placed against the Brushes and Then the Flannel-Covered Drum



This Folding Sleeve Board Occupies Little Space and may be Kept in a Drawer Out of the Way When Not in Use. Also It will Fit into a Trunk. The Price Is 50 Cents



Here Is a Very Convenient Pouring Lip That may be Readily Attached to the Necks of Large Cans of Various Kinds. It Is Useful for Household, Garage, and Store Purposes, and Costs a Quarter



For Cravats This Is a Sensibly Contrived Case, Backed with Black Seal-Grain Leather and Lined with Moreen. The Pockets Are for Collar Buttons and Scarf Pins. The Price Is $3

Those Who Admire Distinctive Designs will Doubtless Find This a Pleasing Combination. Both the Cream Pitcher and Loaf-Sugar Tray Are of Engraved Silver. The Price Is $12

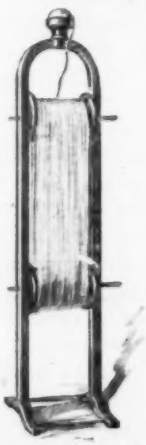
For the Manicure Set: A Rotary Nail Buffer That is Easily Operated When in Either Hand

A Work Bag at $2 That Is Both Dainty and Serviceable. The Lower Part is Made of Flowered Cretonne Trimmed with Gold Braid. The Top Is of Pink Silk

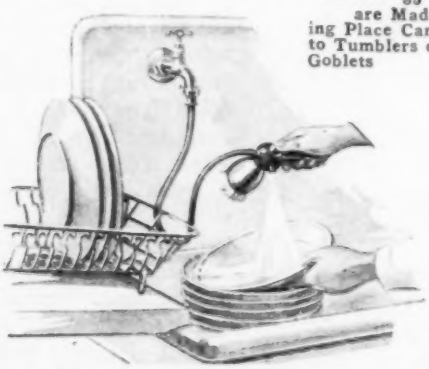
Here Is a Holder for Dental Thread That Permits One to Give the Teeth Proper Attention without the Customary Gymnastics. It Sells for 50 Cents

This Shapely, Long-Stemmed Vase, Fitted with a Wire Mesh Holder, Permits a Few Roses or Carnations to be Grouped Artistically. It may be Had for $16

Silver "Clothes Pins," Costing 35 Cents Each, are Made for Attaching Place Cards to Tumblers or Goblets



Yarn Winder of Artistic as Well as Serviceable Type. It is Finished in Black with Chinese Lacquer in Gold, and Is Available at $12.50 and More

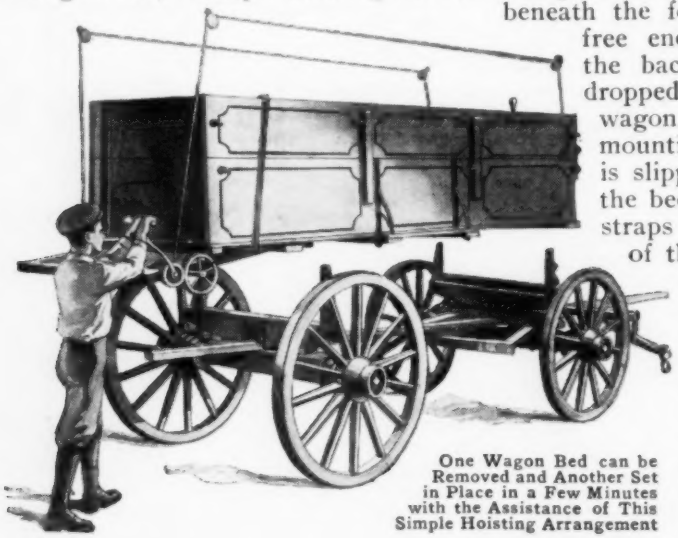


Sanitary Fountain Dish Mop, with Soap Compartment, Connected with Hot-Water Faucet. A Strong, Clear Spray is Afforded by Pressing a Button. It Is a Convenient Kitchen Accessory and Costs $5

When This Steel Loop is Slipped over a Door-Knob Shaft and One Prong Thrust through the Hole in the Key, It Is Impossible to Turn or Remove the Latter from the Outside. The Price Is 15 Cents

WAGON BED REMOVED EASILY WITH INEXPENSIVE HOIST

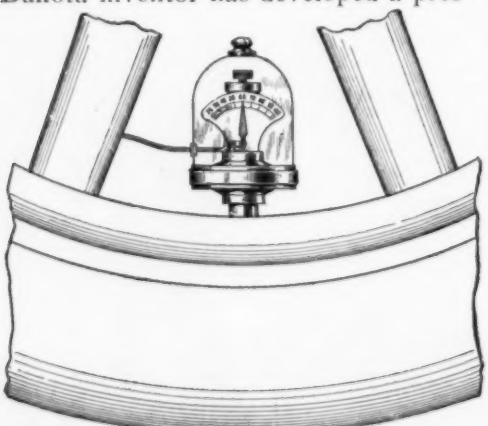
To obviate the heavy lifting that usually attends the work of changing a wagon bed, a simple hoisting device has been brought out which resolves the task into an easy one-man job. Four pulleys are fastened to the rafters of a barn or shelter in positions corresponding to the corners of a vehicle. A rope is strung over these and passed beneath the forepart of the bed, the free ends being drawn across the back pair of pulleys and dropped at the rear of the wagon. A wooden frame mounting a crank-turned shaft is slipped beneath the rear of the bed and fastened by metal straps that hook over the tops of the opposite side boards. By attaching the loose ends of the rope to the shaft, and revolving the latter by turning the crank, the bed is lifted free from the wagon without difficulty. In a similar manner another bed can then be put in place.



One Wagon Bed can be Removed and Another Set in Place in a Few Minutes with the Assistance of This Simple Hoisting Arrangement

IMPROPER TIRE INFLATION PREVENTED BY VALVE

To insure the proper inflation of motor-car tires at all times, a North Dakota inventor has developed a pressure-indicating and controlling air valve which is capable of being employed in several ways. Primarily, however, the instrument is supposed to be attached permanently to the valve of each of the four tires of a machine and connected by means of wires to an electric annunciator installed on the dash. It is 1¾ in. in height, 1⅛ in. wide, and adjustable so that it is suitable for pneumatics of various sizes and capacities. When a tire equipped with the valve is being filled, it is pumped only to the pressure recommended by its manufacturer, for when this is reached the adjusted valve automatically closes, releasing the further flow coming through the supply tube. At the same time an electric contact is made which trips a leaf on the annunciator, indicating that a specific tire has been adequately inflated. When it is not wished to equip a car with a complete set of the valves, one of them may be used as a pocket gauge. Likewise the device can be attached to the supply tube at a filling station and similarly used.



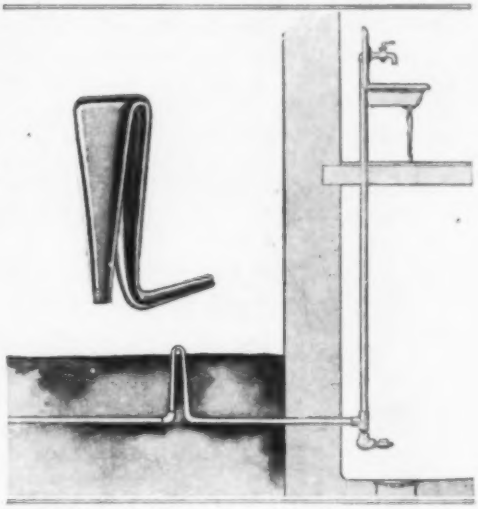
The Valve is Electrically Connected with an Annunciator on the Dash Which Informs a Motorist When the Proper Amount of Air has been Delivered to a Tire

BRITISH FLYING SCHOOL LOCATED IN EGYPT

Recent reports from Cairo, Egypt, tell of an aviation school which the British have established at some point in that country, the name of which has not been revealed. The institution's plant is said to be almost complete. As soon as work is begun its officers expect to turn out at least seven qualified airmen each week as long as the war lasts. The school was located in Egypt because it is within easy access to the various theaters of war and the climatic conditions there are such that flying can be undertaken practically all the year round. It is said that this will be one of the largest and best-equipped flying schools in the world.

QUEER CUT-OFF IS DEVISED FOR WATER-PIPE SYSTEM

To safeguard against the bursting of water pipes in a residence or building during an unexpected cold snap, an automatic low-temperature cut-off system has been devised for use in certain sections of the South where freezing weather is the exception rather than the rule during the winter. The arrangement is not one which could be applied advantageously in localities where cold temperatures might prevail for long durations. Briefly, the arrangement consists in part of inserting a U-shaped piece of tubing in the supply pipe, allowing its curved part to project an inch or so above the surface of the ground on the outside of a dwelling. This comprises the cut-off, and is a tapering, flattened member with a broad passage that is only ⅛ in. deep at the bend. The water at this point will freeze quickly if the atmospheric temperature drops low, thus shutting off the water supply. An automatic drain is provided in the basement of the dwelling. This is controlled by a spring, which unseats the valve head when relieved from the heavy service pressure and allows the water in the house pipes to flow into a catch basin. That the water may drain properly, a faucet, fitted with an air valve which opens when the pressure is off, is used at the highest point in the piping system. Both this valve and that in the drain close when the pressure returns.



The Passage through the "Cut-Off" Is so Shallow That the Pipe does Not Burst When the Water Freezes within It

DOG CARRIED ON BICYCLE TO PROTECT MESSENGER

A trusted messenger of a Philadelphia contracting firm, who carries large sums of money to gangs of working men in various parts of the city, has devised an out-of-the-ordinary means of protection against robbers. Because

Messenger, Who Carries Large Sums of Money, Takes His Bulldog with Him on His Bicycle Journeys, for Protection

of the fact that a large number of persons know that this man carries money in the bag slung over his shoulder, his employers suggested that he purchase a revolver with which to protect himself in case of attack. Instead of buying a weapon he attached a shallow box to the bicycle frame behind the seat, just over the rear wheel. In this he carries his powerful pet bulldog when he goes on these trips, and thus far no one has ventured to molest him.

CONVENIENT POINTS FOUND IN NEW PIPE WRENCH

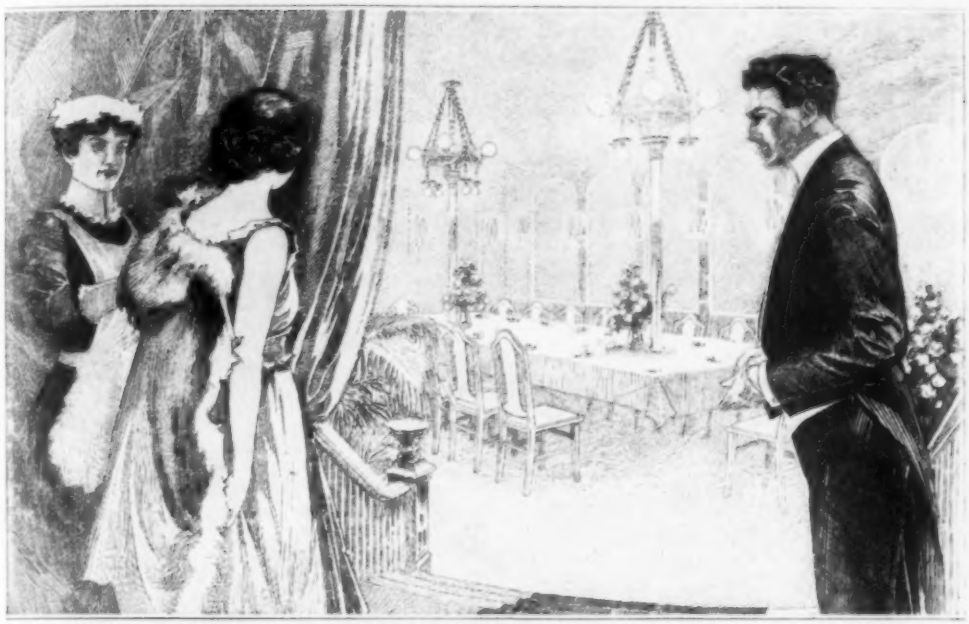
Several good features are embodied in a heavy wrench that is particularly designed for work involving air-brake, steam, and water pipes of locomotives or railway cars. It consists of three simple working parts and is entirely free from springs, ratchets, and pins. One of the levers actuates a jaw member through a knuckle-joint connection. The toothed surfaces of the jaws are curved, so that they partly describe a circle when set about a pipe and grip two-thirds of its circumference. This gives the device a great holding power and also obviates the danger of a pipe being crushed. Although the wrench is intended especially to be used on one size of pipe, its usefulness is not limited in this particular. For instance, a ¾-in. wrench does its best work on pipe of the same size, but will also grip ⅜ and ½-in. tubes. The tool is a convenient one when work is being done on nested pipes that are close to walls or floors.

NEED OF CANALS IN PEACE AND WAR SHOWN

In a recent discussion of what means of transporting materials could be employed by the military authorities of this country in case the railways could not be relied on, a naval officer showed in detail the great need for inland waterways and coastal canals. In making plans at the time the railway strike was pending, he said the Navy Department found that points on the Great Lakes, in Massachusetts, Connecticut, and elsewhere, which furnish quantities of materials and supplies, could be reached by water with little difficulty. On the other hand there were found to be many other points, such as Pittsburgh and cities in Ohio, whose products are of vital importance, which had no adequate water routes. In case of a war, even more than in case of a strike, the isolation of these cities which would result if trains did not run, would be a source of grave weakness. It was pointed out, also, that many merchant ships would soon be helpless without railways to supply them with coal. All these facts were cited to show the need of keeping up our canals, many of which are now neglected, and of building new ones, including coastal canals, for use in times of peace as well as war.

LEGLESS BANQUET TABLE HANGS FROM CEILING

A Milwaukee restaurant keeper has constructed a legless banqueting table. It has no supports beneath but is held firmly in position by two pipes which are fastened to chandeliers immediately above it. The inventor claims many advantages for this sort of banqueting board. By merely unscrewing the pipes from the chandeliers the table can be removed after a meal, and the floor thus cleared for dancing, or entirely occupied by banqueters and others who wish to listen to after-dinner speaking. The advantages of tables like this when the floor is to be cleaned is obvious. When stored, such

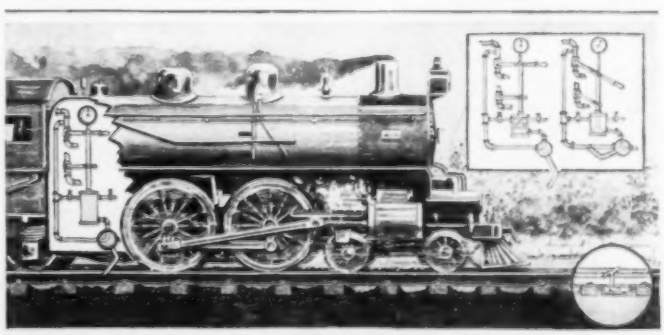


A Legless Banquet Table Suspended from Chandeliers: The Pipes Which Support the Table can be Quickly Detached

tables would occupy small space. After the supporting pipes have been removed, a cap is screwed to the chandelier to conceal the place where the attachment is made.

NEW SAFETY DEVICE GUARDS AGAINST RAIL ACCIDENTS

Experiments are being conducted by one of the eastern railways with a safety device which a Rochester inventor has evolved for the purpose of eliminating accidents caused by the occasional failure of locomotive engineers to observe danger signals. Particularly during heavy storms and dense fogs, it is extremely difficult for a pilot to see a semaphore. The safety appliance is intended to control the speed of the train mechanically, so that it cannot run into an open switch or collide with another one if the signals are properly set. The appliance is installed in a locomotive and consists of an arrangement which permits the steam to be cut off and the brakes applied, when a lever arm, extended adjacent to one of the rails, strikes a trip fixed on the track and regulated either mechanically or electrically by connection with a regular signal system. Thus, when a towerman sets a semaphore to stop an approaching train, and the engineer of the latter fails to see it, the lever arm of the controlling device hits the trip, and the train is brought to a stop.



Railway Crashes, Due to the Failure of an Engineer to Observe the Signals, are Avoided by the Use of This Safety Appliance Now being Tested by an Eastern Railroad

TWO PAGES OF INTERESTING PICTURES AND

Even Brushes are Now Made Just the Right Size for the Little Girl Who Plays House. The Set Shown Here Costs 85 Cents. The Shapes are Suited to Many Needs

A Toy Which Makes a Motion Picture: Turn the Crank and a Drum Inside Revolves so That a Series of Drawings Reflects in the Mirror and Produces the Same Effect as a Real "Movie"

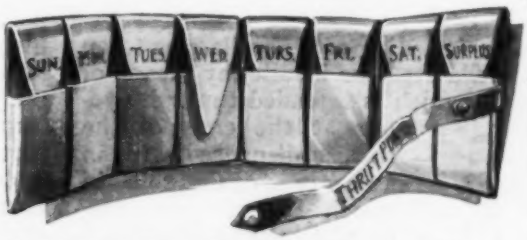
Below: A Vase That Little Folks will Enjoy: Made of Carved Wood with an Opening at the Top to Receive Flowers Which can be Placed so as to Trim the Girl's Hat in a Very Pretty Manner

A Tricycle for Tiny Riders: It Has a Strong Wooden Frame and Wheels That Are Hard to Break, and is Built so Low That There Is Little Danger from Falling

A Car for Boys and Girls That Affords All the Joys of Motoring: It is Steered and Controlled Like an Automobile and is Driven by a Motor Wheel at the Rear

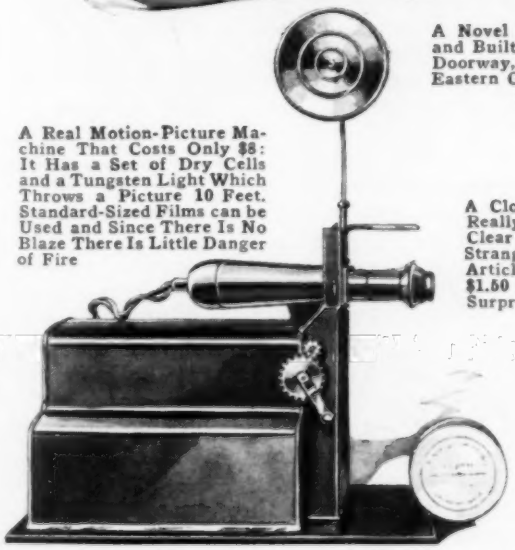
IDEAS FOR CHILDREN OF VARIOUS AGES

Front View of the Car Pictured in Center of Page, Showing Hooded Recess for the Driver, Who Usually Is the Little Girl's Father



A Seven-Day Purse, Costing 50 Cents, with a Separate Pocket for Each Day's Coins and One Besides for Surplus. This Purse Makes It Easy to Spend Only a Certain Amount Daily and Also to Lay Aside a Few Pennies or Dimes

A Novel Car Furnished Just Like a Limousine and Built Especially for the Little Lady in the Doorway, Who Is the Youngest Member of an Eastern Grand Opera Company. If Desired the Motorcycle can be Detached

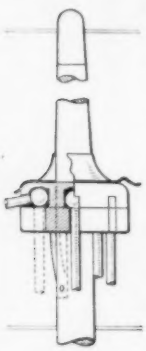


A Real Motion-Picture Machine That Costs Only $8: It Has a Set of Dry Cells and a Tungsten Light Which Throws a Picture 10 Feet. Standard-Sized Films can be Used and Since There Is No Blaze There Is Little Danger of Fire

A Cloth Kitten That Is Really a Grab Bag Filled Clear to the Top with Strange and Interesting Articles. The Price Is $1.50 for the Cat and Surprise Packages

NEW UMBRELLA FRAME HAS BALL-AND-SOCKET JOINTS

The fastening of umbrella ribs to an umbrella staff, or handle, by means of a wire which is threaded through eyelets at the ends of the ribs, is dispensed with in a new type of umbrella, in which the ribs are fastened to the staff by ball-and-socket joints. The end of each rib is fashioned into a ball. Each of these balls fits into a socket in an aluminum ring that is properly positioned on the staff. After all the ribs have been put in place, a locking ring is slipped up next to the member containing the sockets and serves to keep the ribs from dropping out. At the same time they are free to swing into a radial position, as when the umbrella is opened, because of narrow slits in the rings, which are arranged radially around the staff. In case a rib is broken it is only necessary to release a catch which holds the second, or locking, ring in position, and then the broken member can be taken out and a new one substituted. An umbrella of this type can be closed very compactly.



GREAT LOSS RESULTS FROM BUYING WATER IN GRAIN

Under conditions which today govern the buying and selling of grain, flour, and cotton seed, too much water is apt to figure in the transactions. A farmer shipping five cars of grain having a moisture content of 20 per cent, pays freight on one carload of water, whereas, if by proper treatment he had brought his product down to a 12-per-cent moisture content, he would be saving freight on two-fifths of a car of water. Experts of the Department of Agriculture contend that the weight of water, which exists in varying proportions in the products named, should be subtracted and only the dry material considered in buying and selling. This would be a benefit to the farmer, for now the buyer of grain usually makes his price sufficiently low to allow for loss or for the cost of artificially drying the grain, even though the grower has furnished a very dry product. The department has prepared comparative tables which make it easy to compute values on a dry-matter basis. Such a standard, if adopted, would be an incentive for the farmer to produce drier grains and hence grains less subject to loss from spoiling.

OSAGE ORANGE TO BE USED IN MAKING DYES

Extensive experiments, which have been in progress for some time, indicate that Osage-orange wood can be utilized for dyeing purposes. It is believed that this fact will not only relieve the situation with regard to the shortage of aniline dyes in certain shades but may eventually replace the use of fustic, a dyewood of which about 4,000 tons are now imported annually from the tropics. It is estimated that the yearly mill waste from the present manufacture of Osage orange is more than 25,000 tons, a fact which gives some indication of the available supply of this wood. The same dye has been found in the Osage orange as in fustic, and in some respects is more uniform than that in the tropical wood. Among the colors for which it can be used are orange-yellow, old gold, deep tan, olive, and chocolate shades. American manufacturing interests are also taking steps to overcome the present shortage in dyestuffs. A large chemical company, now completing an immense plant in the East, has announced that its principal products will be used in the manufacture of dye materials. This plant, it is said, will be the only one of its kind in the United States.

¶To avoid their being confused with other kinds of tractors, an English publication now refers to farm tractors as "agrimotors."

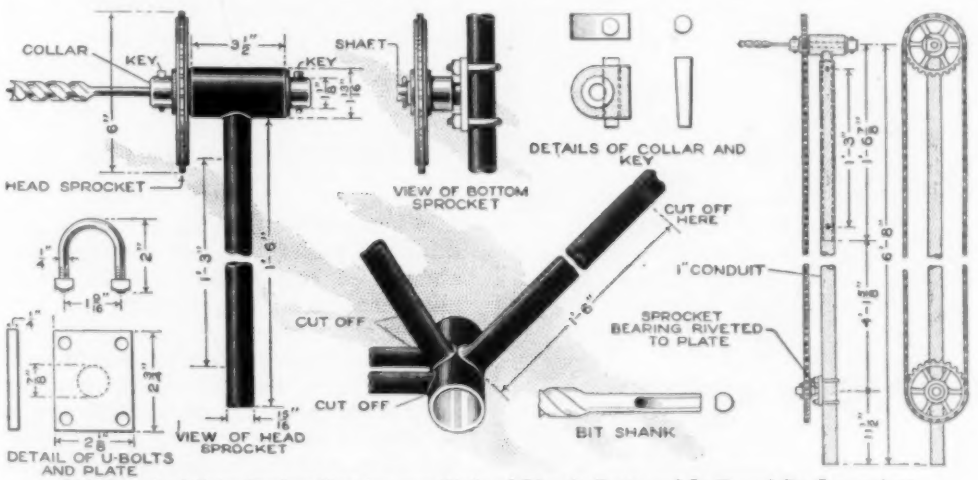
Homemade Joist-Boring Machine

By CHARLES H. TRAPP

AN easily constructed joist-boring machine, which is particularly adapted for boring holes for knob-and-tube wiring in basements, is shown in the illustration. The ordinary joist-boring machine is usually too long for convenient use in a basement, hence the especial value of the one described. The machine is of one-piece construction, that is, it is not jointed as are some borers, which makes it light, and easily transported and handled. It consists essentially of a piece of 1-in. conduit, 6 ft. 6 in. long, two sprockets, 13 ft. of bicycle chain, and a twist bit, these materials being inexpensive and readily obtainable.

The head sprocket, as shown in detail, is mounted on a shaft contained in the bearing of the driving sprocket, cut from an old bicycle frame. It is 6 in. in diameter, the same size as the bottom sprocket. Obviously, if the head sprocket is smaller than the bottom one, the machine will "feed" faster, with the same number of revolutions of the bottom sprocket, than when the sprockets are the same. The bearing for the head sprocket being taken from an old bicycle, the shaft to which the sprocket is attached revolves on ball bearings and is adjusted and held in place by cones, washers, collars, and keys. The column supporting the bearing is telescoped into the 1-in. conduit. It is about 1 ft. 6 in. long, and is riveted into place.

The twist bit is inserted into a hole, 1½ in. deep, drilled into the shaft or axle, as shown at the left, and is held rigidly in place by a key driven through the collar. The shank of the bit is first cut off, as shown, and then filed flat. The bit is inserted in the hole in the shaft, and the key, which also has a flat side, is driven through the collar



This Practical Joist-Boring Machine was Made of Bicycle Parts and Is Especially Convenient in Knob-and-Tube Work

so that the flat side of the key rests tightly against the flat side of the bit shank, holding the bit firmly in place.

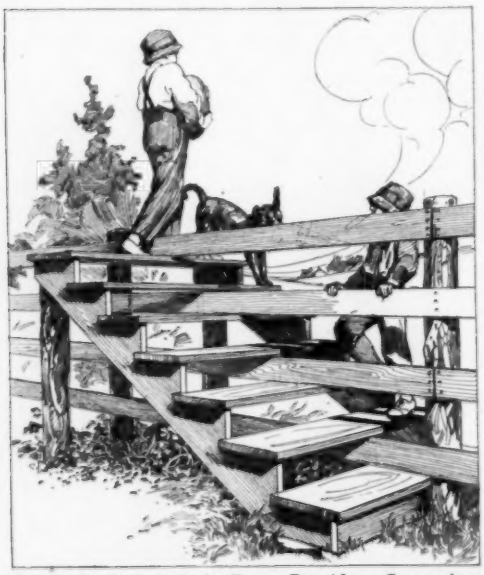
The bottom-sprocket bearing is riveted to a ¼ by 2⅛ by 2¾-in. iron plate, drilled in each corner for ¼-in. bolts. The plate is then attached to the conduit frame with two ¼-in. U-bolts, shown in the sketch. The bottom sprocket is held in place on the bearing and shaft with a nut and washer, secured further by a spring cotter.

When assembling the machine, the head sprocket should first be fixed into place. Then the chain should be assembled and placed over the head sprocket and the bottom sprocket should be adjusted at such a distance from the head sprocket that the chain will be reasonably taut when the machine is operated. It is well to make the borer of such a height—about 6 ft. 8 in. is satisfactory—that it can be used conveniently in basements with low ceilings. If the borer is too short for use in some basements, it can be raised by inserting a rod, of suitable length, in the bottom end of the conduit.

To operate the machine, make the proper adjustments as to height, set it up at the joist to be bored, grasp the conduit frame firmly with the left hand and feed the bit into the joist by pulling down on the chain with the right hand. While boring, pressure should be exerted against the machine with the left hand. This will, of course, cause it to feed faster. When the hole is bored, the machine, still held by the left hand, should be pulled toward the operator while the chain is moved quickly up and down with the right hand, making it easier to remove the bit, and giving a clean-cut hole.

Stairs for Climbing over Fence

Modern farm fencing is not well adapted for providing a foothold to climb over it, and the adaptation of an idea, not altogether new, shown in the sketch, might be used with profit in many places. When a convenient means of climbing over a fence is provided, damage to the fence by careless climbers is avoided. A stairs built to extend on both sides of the fence is a simple and practical means of travel between adjoining grounds. It is a barrier to stock, and if well made it will prove serviceable and inexpensive.—J. H. Moore, Hamilton, Canada.



The Stairs Built into the Fence Provides a Convenient Method of Climbing over the Barrier

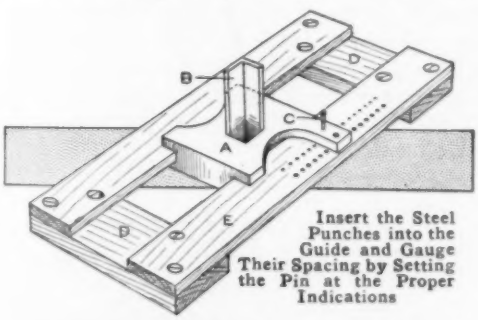
Kink in Overhauling a Gasoline Engine

When overhauling an automobile, or other gasoline, engine extreme care should be taken that the valves be numbered and reassembled to their proper valve stems. Trouble in assembling may thus be avoided, for in not a few instances noisy and sticky valves are traced to errors in assembling apparently identical parts. The valves and parts to which they are fitted are numbered in many engines; when this is not the case, a good plan is to tie numbered paper tags to the parts which correspond as they are separated.—Adolph Klein, New York, N. Y.

Gauge for Spacing Steel-Marking Punches

Names, or other indications on tools, punched into the surface by the use of individual punches, are often unsightly because it is difficult to aline them properly. The device shown in the illustration provides a simple and accurate means of gauging the spacing of the letters or figures, and can be adapted to various sizes of punches.

I have two alphabets, 1/16 in. and 1/4 in. in height, and for the former I found that a spacing of 12 letters to the inch is satisfactory; for the latter I use five letters to the inch. I made a sliding piece, A, of brass, and brazed an angle, B, to it, as shown. The steel punches fit into the angle, which acts as a guide in conjunction with the spacing gauge marked on the forward strip of the frame. The vertical angle is 1/2 in. shorter than the punches and its lower edge is flush with that of the sliding piece. The frame was made of hardwood strips, the end pieces D being fastened to the sidepieces E by means of screws, countersunk. The indications for the spacing of the two sizes of letters were made on the frame and a small pin was fitted to the sliding



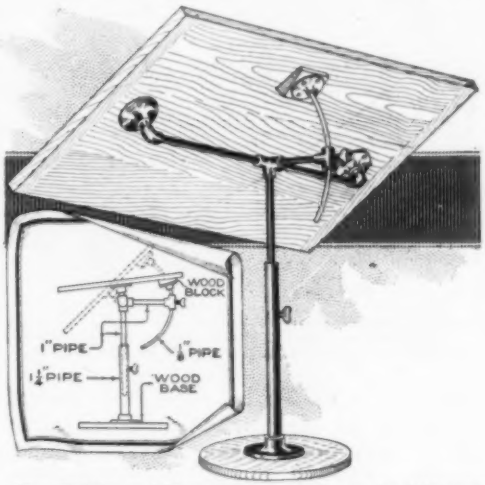
Insert the Steel Punches into the Guide and Gauge Their Spacing by Setting the Pin at the Proper Indications

piece to engage the holes. This insures the accurate spacing of the letters, both as to being in a straight line and as to distance apart.—Harry G. Fesenfeld, Black Earth, Wis.

¶To split off a tight machine nut with a cold chisel is sometimes more economical than to risk ruining the bolt threads.

Drafting Table Made of Pipes and Fittings

I made and used a drafting table like that shown in the illustration, and



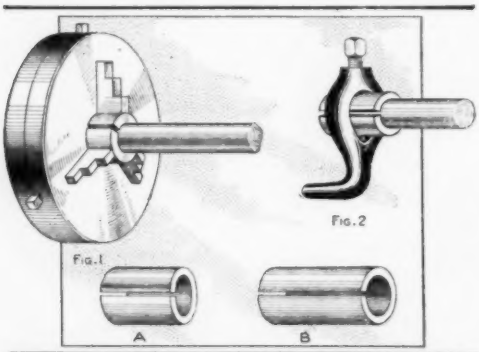
The Height and Slant of the Board may be Adjusted over a Wide Range by Means of the Thumbscrews

it has given complete satisfaction; in fact, I find it as convenient as any commercial table I have ever used. It was made for a large drawing board, but can be adapted to a board of any of the sizes ordinarily used. The base was made of a wooden disk, 20 in. in diameter. A flange and a 1 1/4-in. pipe was used for the lower section, and 1-in. pipe for the upper parts of the support. The curved part by which the slant of the top is adjusted was made of a 1/8-in. pipe screwed into a flange which was fastened to the board as shown. The pipes were drilled and tapped for thumbscrews, by means of which the board is held at the desired angle and height.—Armydis E. Sturdivant, Newcastle, Ind.

Bushing Avoids Marring of Work in Lathe Dog or Chuck

It is frequently necessary to grip highly polished work, such as ground spindles and polished brass pieces, in lathe dogs or chucks. To prevent their marring by the setscrew of the dog or the jaws of the chuck, I have found

the following method to be superior to many others I have tried: A bushing of soft steel is bored and reamed smooth to a push fit, on the shaft or

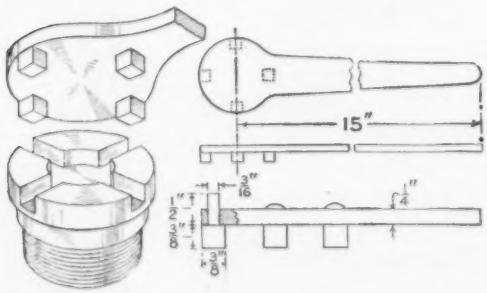


The Smoothly Turned Split Bushings Protect Highly Polished Spindles in the Chuck or Lathe Dog

spindle to be held. This is mounted on an arbor and turned down so as to leave the walls of the bushing 5/16 in. thick. A 1/16-in. slot is cut through the bushing, as shown in the sketch at A and B, two useful sizes. The burr is removed and the bushing smoothed carefully with emery cloth. Fig. 1 shows the bushing in use in a chuck, and Fig. 2 in a lathe dog. Where much of this work is done it is desirable to provide several such bushings of standard sizes.—Richard H. Jehlicka, Worcester, Mass.

A Valve-Cap Wrench

The valve-cap wrench illustrated was made after two other types had



Wrench Made Similar to a Spanner for Turning Valve Caps In and Out of Place

proved failures. The body of the wrench is constructed of 1/4-in. cold-rolled steel, 16 1/4 in. long, and the pegs for gripping the slots in the valve cap are made of 3/8-in. square drill rod. The pegs are shouldered so that they can be riveted to the handle. It is a good plan to harden the square end of the pegs, but care should be taken to harden them to a very slight depth.

Making Small Steel Scales

The mechanic will ordinarily profit by purchasing reliable scales or other precision instruments, but if care is taken and the satisfaction of having an accurate homemade scale, of steel, is appreciated, my experience may be of interest. I use a 2-ft. four-fold scale, accurate enough for all ordinary purposes as a pocket rule, made from corset stays, etched and polished to a finish like that of commercial steel rules. The stays are straightened, polished, and covered with a thin layer of paraffin. The indications are carefully scratched upon them, including the numerals for the inch marks. The strips are then placed in a bath of one part nitric acid, one part sulphuric acid, and 12 parts rain water, and permitted to remain until the indications are etched to a sufficient depth. The holes at the ends of the strips are located carefully and rivets placed in them, making the joints tight enough so that the rule remains extended when unfolded.—R. S. Matzen, Fort Collins, Colorado.

Self-Acting Blowpipe

The steadiness of the flame is an important factor in successful blowpipe work; thus, in hard-soldering, the point of fusion may be almost reached, when the withdrawal of the flame for the fraction of a second between breaths will cause quite an appreciable cooling. The knack of maintaining a constant air supply without interruption through the breathing of the operator can be acquired only after long experience. In addition to this difficulty, the mouth blowpipe has the fur-

ther disadvantage of being insanitary, and it is sometimes awkward to reach certain portions of the work with it.

The simple nozzle, or burner, shown in the sketch was devised to overcome these disadvantages. It may be slipped into the end of a ¼-in. rubber tube connected with the gas supply and will produce, without blowing, a long, narrow pencil of blue flame sufficiently hot to melt pins or copper wire quickly. It is apparent that when the tubing is 3 or 4 ft. long, the burner may be used in many positions, and permits one to give undivided attention to the work in hand.

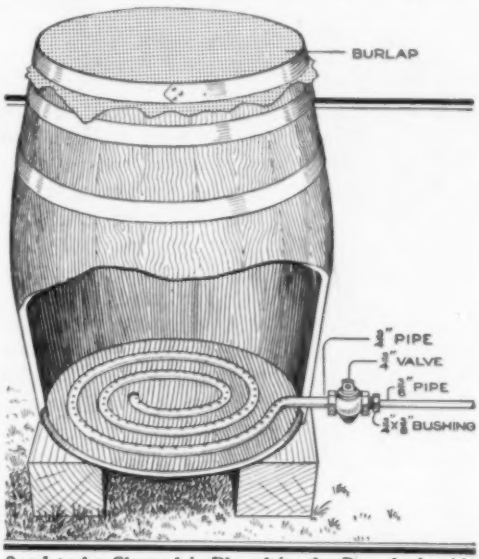
The burner is made from a piece of seamless brass tubing, 5 in. long and ⅛ to ¼ in. in diameter, depending on the size of flame desired. For general soldering, or hard-soldering small work, a tube of ⅛-in. diameter is used. This will produce a flame about 2 in. long. About 1 in. from the forward end, two rectangular openings, ⅛ in. long, are made opposite one another by filing across the tube with the edge of a flat file. A brass plug is then prepared, with a diameter that will just permit its being pushed into the tube, and a tapering hole through the center, with the forward end half as large as an ordinary pin, and is inserted into the tube at the holes, as shown in the upper view. To do this, tin the plug, slip it into place directly back of the air openings, apply a little soldering acid, and solder it in place over a flame. If the tube is too small to make a good

The Use of This Easily Made Blowpipe Obviates the Difficulty of One Operated by the Breath

connection with the gas tubing, build up the back end for about ¾ in. The flame should be bluish, and if it appears yellow, the small hole is too large, hence it is well to make the hole very small and enlarge it if necessary. —John D. Adams, Phoenix, Ariz.

Apparatus for Removing Dust in Sand

In railroad shops, and elsewhere where clean sand is required, the



Sand to be Cleaned is Placed in the Barrel, the Air is Turned On, and the Dust Blown Out through the Burlap Covering

apparatus shown in the illustration will be found useful. A strong barrel was fitted with a plugged coil of ¾-in. pipe, in the upper surface of which ¼-in. holes were drilled 1 in. apart. The coil was connected to a compressed-air supply, regulated by a valve. The sand is poured into the barrel, a covering of burlap is fitted over the top by means of the upper hoop, and the air is turned on. The dust is blown out through the burlap, cleaning the sand thoroughly.—J. K. Long, Renovo, Pennsylvania.

Keeping Automobile Warm in Winter

Considerable heat from an automobile engine ordinarily is wasted, and may be utilized in cold weather for heating the tonneau. It is necessary only to remove the floor board back of the engine and permit the heat to pass up into the car. It is not desirable, of course, to close the car so tightly that there is little or no ventilation, since the heated air from the engine is not pure.—Fred Reschke, Racine, Wis.

A Wing-Joist Frame Barn

By W. E. Frudden

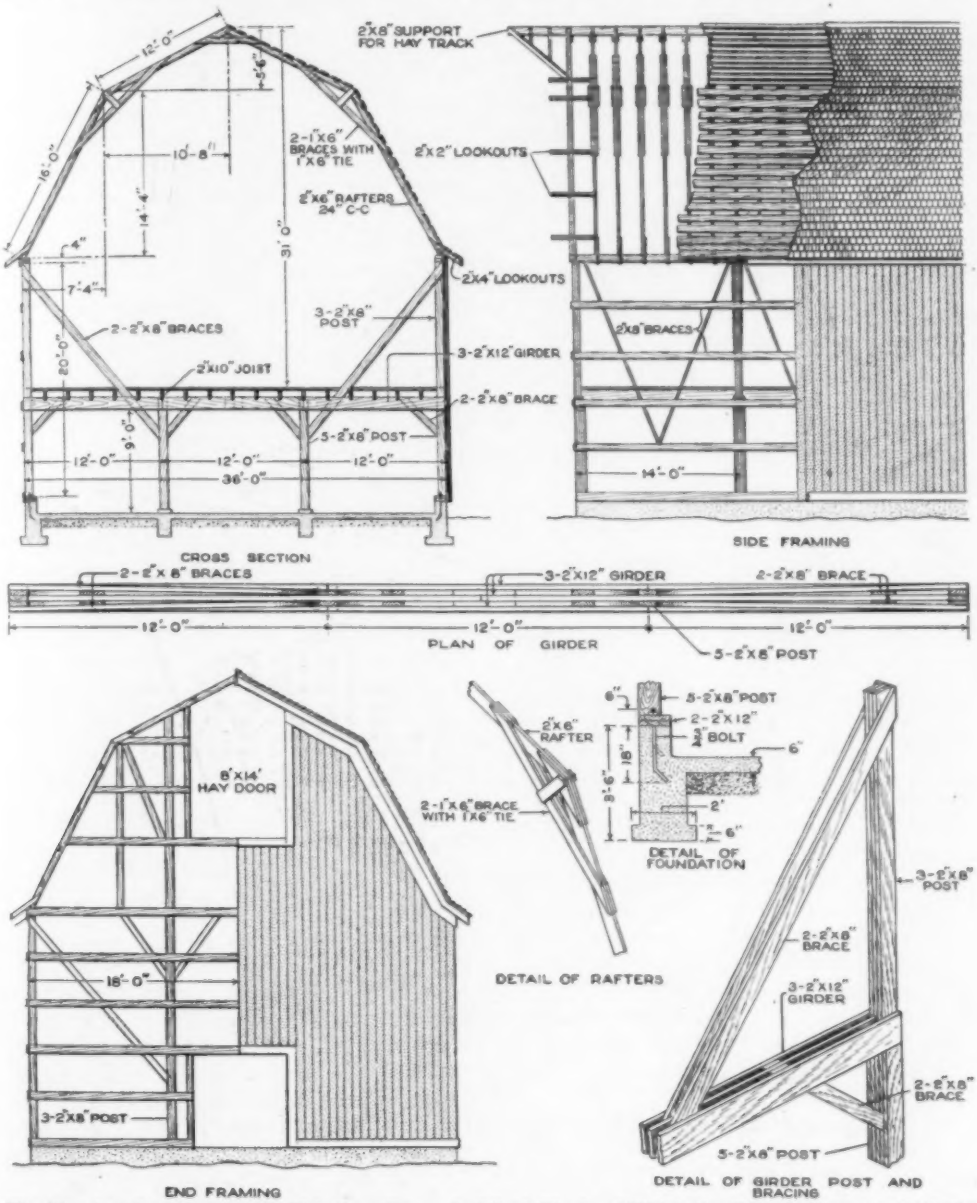
RISING land values and prosperity on the farm are reflected in the farm buildings, the barn as well as the home, and farms generally are provided with better barns for the storage of crops and the housing of animals than a generation ago. However, the construction of farm buildings, especially large barns, has undergone a great change, due largely to the increased cost of labor and the growing scarcity of lumber. The old-fashioned heavy-timber barns built years ago required sufficient lumber for two barns of the type shown in the illustration, and were usually built by a large number of men, gathered for the occasion at the familiar "barn raising." The building of a wing-joist barn requires only a small crew of men, and is economical of lumber. As a result a time-honored neighborly institution is becoming obsolete.

Every piece of lumber that is a part of the barn described is essential to its construction, yet the factors of safety, wind strain, snow loads, and other structural considerations, are amply provided for. The heaviest lumber used in it is 2 in. thick. The frames and other heavier parts are built up of plank, and the small parts may be made of short sections of stock, the waste being thus reduced to a minimum. The truss system used permits construction without crossbeams in the barn, so that the floor is clear except for the braces, and the haymows are free from obstructions. Standard methods are used throughout in the construction, so that any competent carpenter contractor and his men can build the barn properly. The lumber used is of commercial sizes available even in small country lumberyards.

While the wing-joist type of construction is not new, several features of the design shown are interesting and practical. In most barns of this type the floor joists extend crosswise of the structure, whereas those of the barn described are set lengthwise, on built-up plank girders, set on 14-ft. centers across the barn. The joists near the center, which must bear the greatest load, are spaced 20 in. on centers, and those at the sides are set 2 ft. apart. The trusses are set on 14-ft. centers, and can, of course, be adjusted under this distance to accommodate the spacing to various lengths of barns. They are built on the ground, the parts being cut in batches according to their size and shape, for all of the trusses, before assembling them. This process can be applied profitably to all of the construction, where a number of sections are built up in duplicate. As the parts for the trusses are assembled, they are piled up on the ground, and placed in position on the barn floor, when that stage has been reached in the raising of the barn. The barn is sided and shingled in the ordinary manner. The siding extends vertically, as indicated in the shaded portions of the sketches, and is nailed to the 2 by 8-in. braces, extending horizontally around the barn, as shown in the side and end-framing sketches.

Concrete foundations, upon which the ground floor of the barn is built, as shown in the cross section, are generally used instead of stone. The foundation must, of course, be proportioned to the structure to be placed upon it. That shown in the detail view is designed for a structure 36 ft. wide and 56 ft. long, built as indicated. It should be given a wide footing, at least 2 ft. as suggested, and wider if the ground is not well suited for a foundation. The foundation is run up above the ground sufficiently to keep the lower part of the wooden structure

from the soil moisture and drippings from the roof. The sill is anchored to the foundation by means of bolts, the lower ends of which are bent to give a better hold in the concrete. They are set in the concrete when it is placed, and held by templates nailed across the forms for the concrete. Care should be taken that the upper ends, which are threaded, project above the foundation sufficiently to pass through the double-plank sill, and provide for the nuts. The concrete floor should be 6 in. thick, finished smooth. It is



The Heaviest Lumber Used in This Barn Frame Is 2-Inch Plank, of Which the Heavier Parts are Built Up. This Method of Construction Is Economical of Lumber and the Structure can be Built by Only a Few Men. The 14-Foot Sections may be Figured as Standard Units in the Designing of Similar Barns of Various Lengths

desirable to place an 8-in. layer of cinders, or coarse gravel, under the barn floor, to afford good drainage and to provide a footing for animals that is not unduly damp.

Posts built up of five 2 by 8-in. planks support the girders under the floor. They are set on 14-ft. centers, as shown in the side-framing sketch. Their upper ends are arranged so that two of the planks extend between the planks making up the girder, and the others are butted under the lower edges of the outer and center planks of the girder. They are strongly braced by short braces extending to the girders in the center section of the barn, and by long braces extending between the planks of the girder, and fastened to them and to the upper ends of vertical built-up studs or posts along the side of the barn. The construction of the girder is shown in detail in the plan. The long braces are shown in relation to the studs, or side posts, in the detail of the girder post and bracing. The center plank of the stud butts above and below the center plank of the girder. The two outer planks of the stud extend the full length from the eaves to the sills. The outer planks of the girder are nailed over the outer planks of the stud. Cross braces of 2 by 8-in. stuff are placed between the studs to afford support for the nailing of the siding.

The trusses are formed of two rafters, built up of 2 by 6-in. stuff. They are set on 24-in. centers and strongly braced, as shown in the cross section and the side-framing sketch. Lookouts of 2 by 2-in. stock are fixed to the double rafter at the end and to the one adjoining it. Short braced rafters afford a support for the hay-lifting rigging at the end of the ridge. The ridge pole is of 2 by 8-in. plank, and the trolley track for the hay and grain carrier is suspended from the cross braces immediately below it.

The framing of the ends is shown in the lower sketch, and is better understood by referring also to the sketch showing the side framing, to observe the method of building up the corner posts. They are of five planks below the floor and three planks from the floor to the eaves plates.

The other details of the structure are standard, or may be made in various ways in common use. An 8 by 14-ft. hay door is provided in each gable, and double doors give entrance to the ground story. The roof is made of rough boards covered with shingles or other suitable roofing material.

As a basis for computing the materials required for a barn of this type, a 14-ft. section as shown should be listed. The ends are considered separately and must in each case be added to the amount required for a given number of sections. Two thousand feet of dimension lumber is necessary for each end, and 2,200 ft. of siding. The cost of two ends is approximately $300, including the foundation. Each truss complete requires about 560 ft. of lumber. The total cost of a 14-ft. section is about $225, including the foundation, floor, siding, and shingles. The detailed list for a section is as follows:

8 pieces, 2 by 8 in. by 14 ft., for sills.
6 pieces, 2 by 8 in. by 14 ft., for plates.
6 pieces, 2 by 6 in. by 14 ft., for nailing braces.
4 pieces, 2 by 6 in. by 16 ft., for braces.
20 pieces, 2 by 12 in. by 14 ft., for joists.
14 pieces, 2 by 6 in. by 16 ft., for rafters.
14 pieces, 2 by 6 in. by 12 ft., for rafters.
28 pieces, 1 by 8 in. by 12 ft., for hip braces.
7 pieces, 2 by 6 in. by 6 ft., for collar beams.

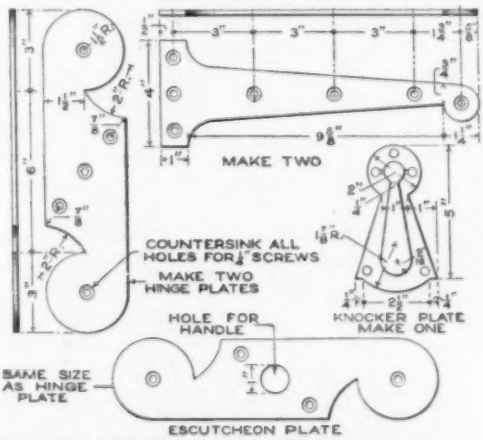
The total dimension lumber required is about 1,600 ft.; siding 470 ft.; shiplap flooring 600 ft., and 7,000 shingles.

Coal Chute Built into Bin

In building a new house I provided a chute into the coal bin that extends from the coal window to the center of the roof of the bin. Instead of it being necessary to enter the bin and shovel the coal away from the wall near the window, as is usually the case, the coal is now distributed evenly in the bin, with the high point of the pile like a pyramid. When the coal is removed from the opening at the lower, inner side nearly the entire pile may be removed without the necessity of shoveling the coal near to the opening. —A. E. Holaday, Naugatuck, Conn.

Hinge Plates and Escutcheon for Door

An interesting feature of exterior doors on craftsman or colonial-style houses is the heavy hardware, consisting of hinge plates, escutcheon, and knocker plate, made of soft sheet iron. These fittings may be made specially for the particular job, of a design suited to the surroundings and the individual taste. The design suggested in the illustration is suited to both of these types and may be readily modified. The stock is 3/16 in. thick, may be cut easily with a hacksaw, and finished on an emery wheel or with a file. The pieces should be cut to the proper width and then laid out, with the points for the holes to be drilled punched with a center punch. The holes are to be countersunk for flat-head wood screws as indicated. The door is supported by its hinges, and the hinge plates are fixed in place at them, the plate at the left being fixed to the frame and the T-shaped strap to the door. An easy method of marking the shape of the pieces on the metal is to lay them out and cut patterns from cardboard, tracing around them to transfer the shape to the iron. Black metal paint protects

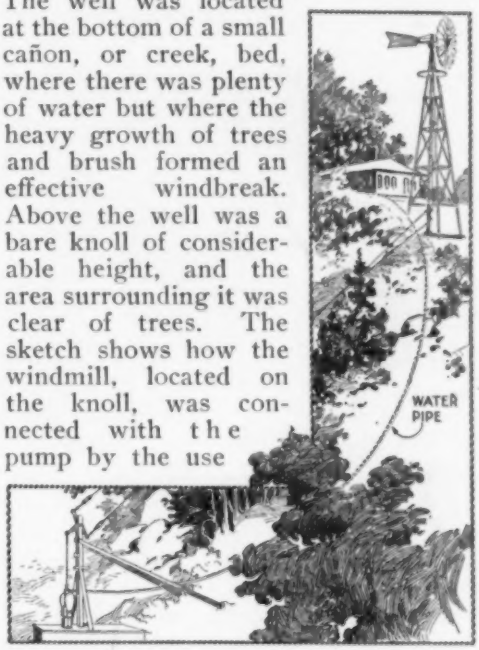


Patterns of Cardboard may be Made for the Pieces, Which are Cut with a Hacksaw

the metal and gives a strong contrast with the door, which may be painted white or stained a rich brown shade.—John E. Cahill, Jr., New York City.

Pump Operated by Distant Windmill

A California farmer had good locations for a windmill and for a well, but they were situated at different points. The well was located at the bottom of a small cañon, or creek, bed, where there was plenty of water but where the heavy growth of trees and brush formed an effective windbreak. Above the well was a bare knoll of considerable height, and the area surrounding it was clear of trees. The sketch shows how the windmill, located on the knoll, was connected with the pump by the use



The Power from the Windmill is Applied to the Pump by Means of Wires and Levers

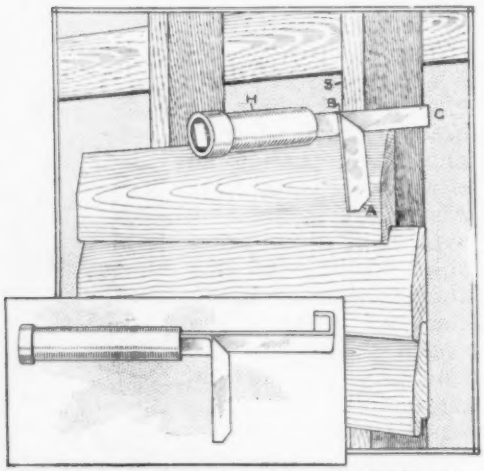
of wires and levers. A lever, shaped somewhat like the letter "T," was fixed to the rod of the pump and supported at its center on a framework set above the well. A similar lever was applied to the power shaft of the windmill. The ends of the upper bars of the levers were connected by wires, as shown, held taut with turnbuckles. This arrangement transmitted the power effectively and was quite simple to install.—John Hoeck, Alameda, Calif.

Clamp Enables One Man to Nail Siding Readily

It is difficult for one man to nail siding on a house because he must hold the board in place while starting the first nail, as well as when marking and cutting the stock. The device shown in the sketch overcomes this difficulty,

and is made of a steel bar fitted to a weighted section of pipe. The end of the bar is hooked to the studding and clamps the board securely.

The clamp is made as follows: Pro-



The Clamp Holds the Board Securely While the Workman Marks, Saws, or Nails It

cure a piece of soft galvanized steel bar, ⅛ by 1 by 30 in. Bend it together 14 in. from one end, and then bend the shorter part to a right angle, 5 in. from the end, at B. Studding is usually 1¾ by 3¾ in., and the end of the longer part of the bar should be bent to the shape shown, so as to hook around the studding S, at C. Allowance must be made for the thickness of the siding—usually ⅞ in.—and ¼ in. additional to give a proper clamping force at A. The handle H is a piece of pipe, 7 in. long. After fitting it over the folded bar, weight it with about 3 lb. of lead.

When the piece of siding is to be fitted into place, hook the clamp on the studding and drop it to bind at A. It will hold boards while marking and sawing them. For long boards, place the clamp near the middle, and in moving boards do not remove the clamp but slide them under it. They will not be scratched if the end is trimmed off at A as shown.—L. M. Drake, Daytona, Fla.

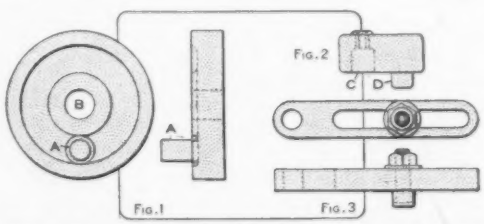
¶Remove burrs from the slots of screws after driving them in, as they are dangerous to the hands.

Determining Strength of Rope

The practical method of determining the strength of rope is to put it under strain and run it over a pulley. Used rope, especially, is deceiving, from outside appearance, as it is often dried out and the inner fibers broken. A breaking strain at one end of the rope will not serve to determine its ability, since the ends are least likely to be worn, and a weak spot in the middle may cause disaster. By running the rope over a pulley, however, and raising a weight considerably in excess of that which is to be handled in actual use, every point can be tested out thoroughly.—J. C. Grindell, St. Louis, Mo.

Adjustable Jig for Drilling Radial Holes

When a number of radial holes are to be drilled accurately in pulleys, or similar machine parts, the jig shown in two forms in the sketch will be found convenient. It was devised for the drilling of holes in a boss, A, as shown in Fig. 1. The jig shown in Fig. 2 was made of a piece of cast iron, drilled at C to fit the boss, and provided with a tempered-steel collar to guide the drill. The lug D was provided to fit into the hole B, as a guide in drilling the hole in the boss. An adaptation of the jig,



Radial Holes in Pulleys, or Similar Machine Parts, may be Drilled Accurately by the Use of This Jig

which may be adjusted for various sizes of pulleys, or other radial drilled work, is shown in Fig. 3. If holes of various sizes are to be drilled, bushings may be fitted into the guide hole at the end of the jig.—C. Anderson, Worcester, Mass.

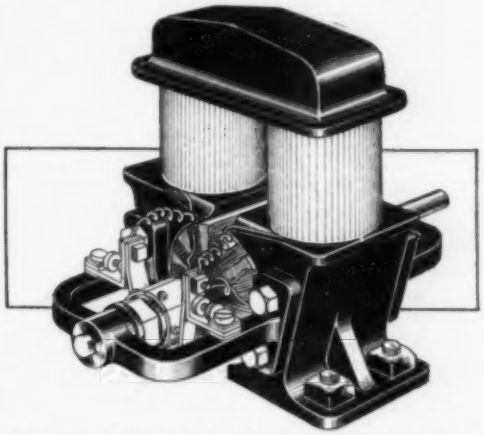
Building an Electrical Generator

By B. FRANCIS DASHIELL

THE making of a small electrical generator affords experience in mechanical and electrical construction that is both interesting and practical. The generator described in this article and shown in detail in the illustrations was designed to be made with comparatively simple machine processes and a minimum use of special tools or devices. It is a 100-watt, direct-current, shunt-wound machine, and the parts are worked out to give a high standard of mechanical practice as well as to withstand hard service. If machine-shop facilities are not directly available, the machining may be done in a commercial shop at small cost. The materials are those in common use for such work, and readily available from dealers.

The making of the patterns and castings should be undertaken first, and only after a close examination of the working drawings in the page plate has been made. The perspective sketch and the assembly views, Figs. 9 and 10, show the general construction and the arrangement of the parts. The patterns are of simple design, and may be made by one familiar with the use of ordinary woodworking tools. Patternmakers' white pine is required for the patterns; glue, screws, brads, and other common means of fastening wooden parts, may be used for this purpose. All nail or other holes in the surfaces must be plugged carefully. The pattern for the field-magnet casting, Figs. 1 and 2, should be made first. It is built up of five parts: the yoke A; the two cylindrical magnet cores B, and the two poles C, which form the sides of the armature tunnel, in which the armature revolves. The dimensions on the drawing are for the finished parts, and allowance must therefore be made for machining the tunnel. Machining is indicated by the standard mark "*f*." The pattern is cast with the parting of the mold on the center line DE in Fig. 2, hence the tunnel and the flat exterior surfaces must be given a slight draft, to make removal from the sand convenient. The draft is produced by slanting the surfaces from the center line toward the edges, to form a slight crown, like that on the face of a pulley.

The bearings, shown in Fig. 3,



This Direct-Current Generator was Designed to be Made with Comparatively Simple Machine Processes

appear similar in the top view H, but that shown at F is 1⅞ in. wide, and that at G, 3⅜ in. wide. They are built up of five parts each, as indicated, and allowance must be made for finishing the castings to the dimensions shown.

The field magnet is cast from the pattern in gray iron of a fine texture, and the bearings are cast in hard bronze. Iron bearings must not be used under any circumstances. Examine the castings thoroughly and reject them if they have flaws.

The castings must then be machined to the dimensions indicated. This work must be done carefully to insure satisfactory operation of the generator. The sides of the poles C are planed parallel, to give them a width of 3 in., as shown in Fig. 2. Then place the field in a lathe chuck and bore out the armature tunnel to a 3-in. diameter, and exactly perpendicular to the planed sides. Too much care cannot be taken in this work.

The machine work on the bearings is slight. Machine the flat faces at the bases; they are to be fitted to the sides of the field magnet. Set the bearings

upright on their bases and drill 3/8-in. holes in the shaft-bearing hubs. Then drill the two holes in each of the bases to fit the 5/16-in. cap screw J, to provide for the fastening of the bearings to the poles.

The commutator, detailed in Fig. 7, is made as follows: Select a piece of round hard-rubber rod, 1 in. long and 1 in. in diameter. Drill a 1/2-in. hole through the center for the shaft. Force a piece of brass or copper tube, of 1/8-in. wall and 1-in. inside diameter, over this core. Tap the tube and core to receive 12 No. 4 .11-in. diameter standard fillister-head machine screws. Place six of them at each of the ends, 1/8 in. in, and space them equally, 60° apart. The screws are like that shown at K. Divide the tube into six equal segments by making kerfs with a hacksaw, lengthwise between the screws. Each segment is thus insulated from the others by air gaps.

The armature and shaft assembly are detailed in Fig. 6. The armature is built up of laminations in the form of disks, cut from thin sheet iron, 2 15/16 in. in diameter, as shown in Fig. 5. Each disk has twelve 3/8 by 3/8-in. openings cut into its edge, spaced equidistant, 30° apart on center radii. Punch a 1/2-in. hole in the center of each and stack them up to form a compact pile, 3 in. high. Place them in a charcoal fire and heat them to a bright red. Cover them with ashes and permit the fire to die out slowly. On removing the disks they are annealed. Clean them with emery cloth, dip them into a thin solution of shellac, and spread them out so that the shellac can dry hard.

The armature shaft is shown in Fig. 6. It is a rolled-steel shafting, 1/2 in. in diameter and 10 in. long. Turn the ends down to 3/8-in. diameter, one end 1 3/8 and the other 2 5/8 in. Thread the ends of the center portion to receive the 1/2-in. hexagonal steel nuts. Assemble the armature disks on the shaft and clamp them between the washers and nuts. Fix the commutator into place similarly.

The bearings must be located on the machined sides of the poles with accuracy. If the armature is found to be out of balance, cut it down or file it slightly in a lathe. Wrap a piece of heavy paper around the armature and fit it into the tunnel snugly. Slip the bearings on the shaft ends, and fit them against the surfaces. Taking care that they do not slip or become displaced, slightly mark the centers of the fastening holes in the pole surfaces with a center punch inserted in the holes. Drill and tap the holes for the screws J. The armature should rotate freely when the bearings are fitted into place. Drill oil holes into the hubs from the upper side, and fit them with cups if desired.

The brushes and brush holders used on this generator are of interesting design, as shown in Figs. 4 and 8. Make the holder of a piece of copper or brass angle, 1/2 in. wide. Solder together three or four strips of thin phosphor bronze at their top edges and drill and tap them for an 8-32 machine screw. Bolt this to the vertical leg of the holder. Drill and tap the lower end of the same leg similarly for an adjusting thumbscrew, with which to move the brush to or from the commutator. Drill the other leg as shown in Fig. 8, for a machine screw, as in Fig. 4, at L. The method of insulating the brush is indicated in Fig. 8. Two fiber, or hard-rubber washers are placed on either side of the holder arm; a short piece of fiber, or hard-rubber tube is slipped over the screw. Place a metal washer under the head to prevent cutting the insulation. Screw the holders tightly to the arms of the bearing, in the holes tapped, as shown in Fig. 3.

The winding of the field magnet is next in order. Cut two strips of heavy paper of sufficient width to cover the magnet cores and long enough to be wrapped twice around them. Paste them on the cores with thick shellac. Cut out four heavy blotting-paper washers, 2 1/2 in. in diameter with 1 3/4-in. holes. Cut them in half and join the pieces in pasting them to the upper and lower inner surfaces of the cores, brushing them over thoroughly with

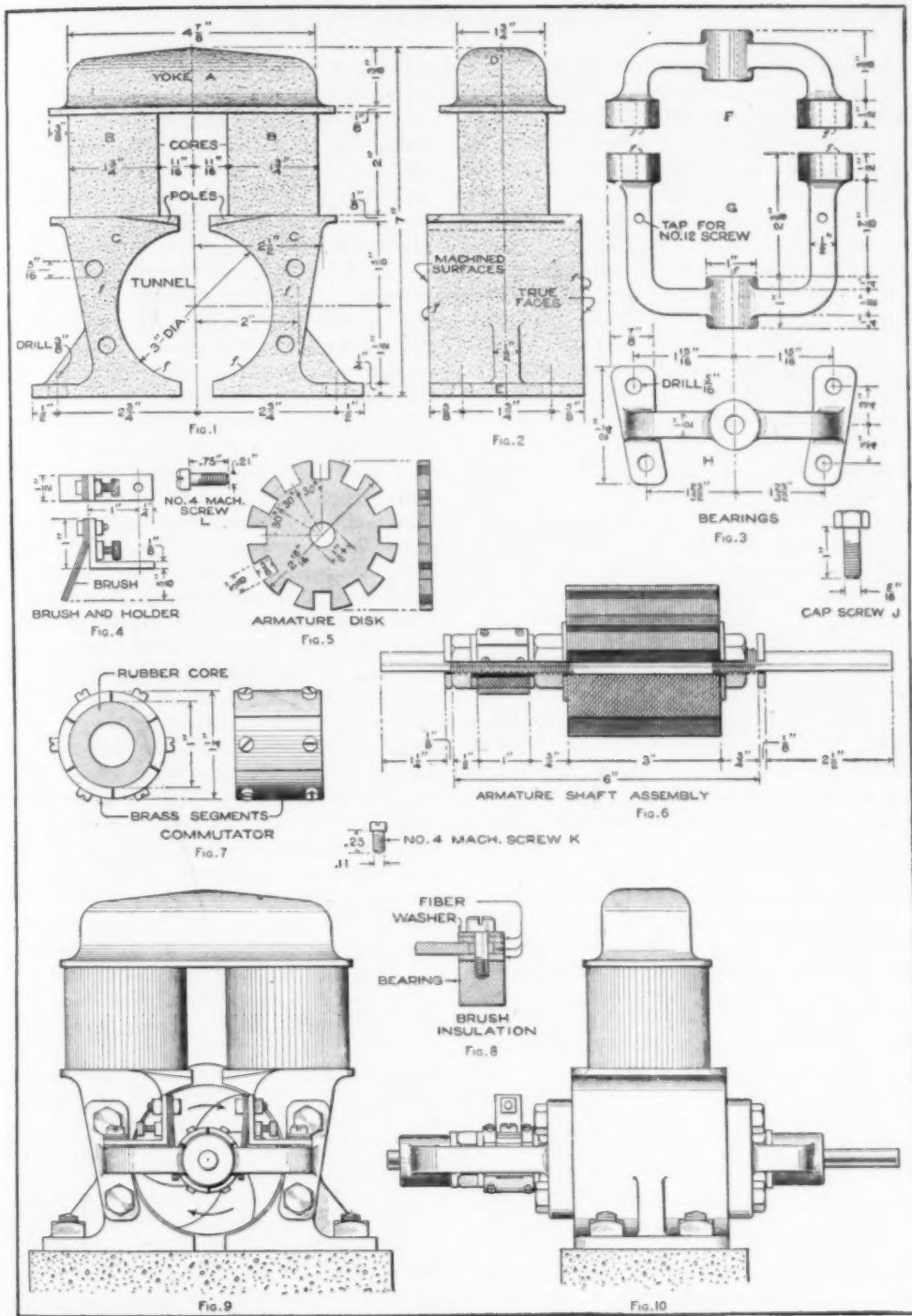
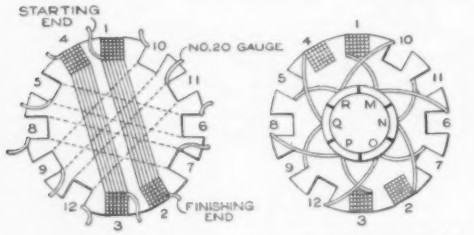


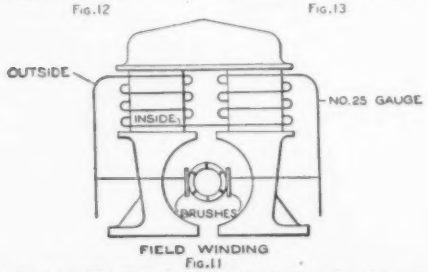
Fig. 1 Fig. 2 Fig. 3 Fig. 4 Fig. 5 Fig. 6 Fig. 7 Fig. 8 Fig. 9 Fig. 10

The Assembly Drawings, Figs. 9 and 10, Show the General Arrangement of the Parts, and the Working Drawings Present the Details of Construction. The Pattern for the Field Magnet, Shown in Fig. 1, is Built Up of Five Parts: The Yoke, Cores, and Poles. It is Cast in Gray Iron of Fine Texture, and the Bearings, Shown in Fig. 3, are Cast in Hard Bronze

shellac. The cores are thus provided with an insulating cover. Permit the shellac to dry before winding the coils.

Prepare the armature core by pasting a circle of heavy paper to each end of





The Field Winding is Indicated in Fig. 11; the Winding of the Coils around the Armature Core is Shown in Fig. 12; and the Connections of the Armature Coils and the Commutator are Shown in Fig. 13

it with shellac. When dry, cut out the square slots. Paste strips of paper, shellacked thoroughly, into the slots their full length, and cover similarly any other exposed parts that may come in contact with the wire in winding.

The winding of the field magnet may now be undertaken. Use No. 25 gauge double cotton-covered copper wire. Wind 16 layers on each magnet core, as shown in the field-wiring diagram, Fig. 11. The wire must be started at the bottom of the core and finished at the lower part of it.

The wiring diagrams must be examined carefully so that errors may be avoided which may require the undoing of considerable work. With this precaution the windings are not difficult to accomplish, even to one inexperienced in this class of work. The two inner ends of the windings are connected, and the two outer ends are wired to the brush connections, as indicated. The inside, or beginning, ends of the wires should have a small rubber tube slipped over them to prevent breaking and to provide proper insulation.

The winding of the armature is more complicated than that of the field magnet, but should present no serious difficulties if the directions are observed step by step. The process, as shown in Fig. 12, is as follows: The armature is held with the commutator end toward the body of the worker, and the roll of wire is placed conveniently on the workbench. Procure 1¾ lb. No. 20 gauge single cotton-covered wire for this purpose. Start the winding in slot No. 1, passing the wire away from the body through the length of the slot, over the opposite end of the armature, and returning the wire in slot No. 2. Continue this winding until the slots are full, which requires about 80 turns. None of the wires must be above the slots or they will interfere when the armature is placed in the tunnel. Turn the armature halfway around to bring slot No. 3 uppermost. Wind as before, passing the wire around the armature in slots 3 and 4, beginning at No. 3. Repeat this process in the slots paired off, as follows: 5 to 6; 7 to 8; 9 to 10; 11 to 12. Turn the armature part way around in each case so that the first of the two slots being used in winding is uppermost. All of the wires must begin at the bottoms of the odd-numbered slots, and end at the tops of even-numbered slots, on the commutator end of the armature. Cover the ends of the wires both at the start and the finish with rubber-tube insulation.

Make the connections to the commutator, as shown in the diagram for this purpose, Fig. 13, which represents the commutator and the end of the armature behind it, as viewed from the commutator end of the armature shaft. Make the connections under the heads of the machine screws at the inner end of the commutator, and solder the screw head, wire, and commutator segment together. Care must be taken that the segments are not soldered together in this process. All the connections must be made very carefully, as a slight error in this phase of the work will prevent the proper operation

of the generator. The commutator must be set on the shaft so that its segments are centered on six alternate slots of the armature, and then clamped by means of the nuts. By beginning with the starting end of the wire in slot No. 1 it may be observed that each of the starting ends is soldered to the inner screw in the commutator segment in advance of the slot. The starting end in slot No. 1 is soldered to segment M; the finishing end of this coil in slot No. 2 to segment N, etc. The finishing end of the wire in each coil is soldered to the commutator segment behind the slot. For example: the finishing end in slot No. 2 is soldered to segment N; that in No. 12 to O, etc. Give the armature and windings a thorough coat of shellac and permit it to dry.

The generator may now be checked to see that all preliminary work has been done, and then assembled for testing. Place the armature in the tunnel and attach the bearings securely by means of the machine screws. Connect a battery of about 12 volts to the field for a minute, magnetizing the poles. Fit the brushes into place, and adjust them to the commutator. Turn on the battery again, and the machine should run as a motor. The commutator must then be given its final adjustment. If the commutator has not been set very accurately on the shaft, it may be necessary to adjust it slightly so that its segments are centered properly with coil-filled slots Nos. 10, 6, 2, 12, 8, and 4, as shown in Fig. 13. The armature should turn clockwise, when the observer is facing the commutator end. The speed on 12 volts will not be high because at least 20 volts are necessary to obtain full speed. This voltage is satisfactory for test purposes.

The generator is now ready to be run in its normal manner. Fix a pulley of suitable size to the extended end of the armature shaft, by means of a setscrew. The special local conditions will determine the size of pulley used. The generator should be run in the same direction as when it was tested by running it as a motor, as indicated in the assembly drawing, Fig. 9. The proper speed is about 2,000 r. p. m., although it should generate satisfactorily, though not to full capacity, at less speed. At full speed it should generate 25 to 30 volts and four amperes. Both bearings should be kept well oiled. Wipe the commutator with a rag dipped in vaseline to keep it bright and clean. The brushes should be set only tight enough to make a satisfactory contact and collect the current.

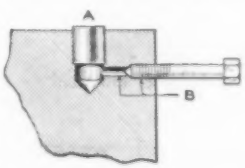
Producing a Blue Finish on Steel

Polished-steel objects may be given a blue finish by placing them in heated charcoal. The surfaces of the metal must be very smooth and clean. The charcoal is powdered and placed in a box made of steel or iron plate. The steel to be blued must be taken out from time to time and dusted with finely powdered whiting. The color should be observed, and when a dark blue is obtained, the work should be permitted to cool, then cleaned and oiled.

¶Provide a special file for filing babbitt, and oil it slightly to prevent the metal from sticking.

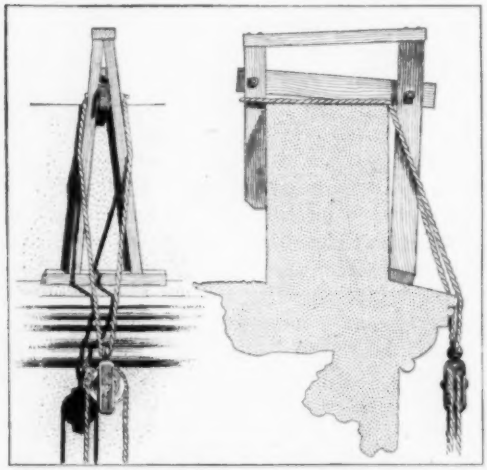
Removing a Plug from Casting

A steel plug, hardened and fitted to a drive fit into a large casting, was to be removed, and the method shown in the sketch was devised for the purpose. A hole was drilled into the side of the casting to a point just below the plug A. The cavity was filled with white lead and oil, and a cap screw, B, was driven into the threaded hole. The result was a miniature ram, which drove the plug out easily without injuring it.—William T. Hummele, Buffalo, N. Y.



Cornice Rigging to Support Ladder Scaffold

Painters, and others who must work on scaffolds supported from the roofs or cornices of buildings, are familiar



The Framework is Strongly Supported on the Wall and Makes the Use of Hooks Unnecessary

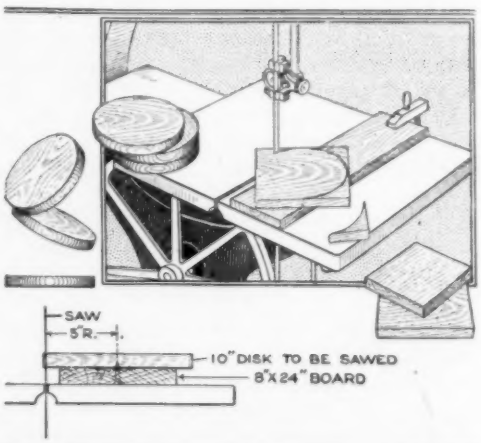
with the difficulty of providing a simple and safe means of attaching the tackle at the roof. The support shown in the illustration is made of 2 by 4-in. stock and fits firmly over the upper edge of the wall. Its front portion consists of an A-shaped frame which bears on the cornice and carries braces near the top. The frame may be made adjustable to various thicknesses of wall by boring additional holes for the bolts in the cross braces. The upper pulleys are supported on ropes secured about the framework.—H. W. Hart, St. Paul, Minn.

Forging Renews Worn Socket Wrenches

The square sockets of wrenches frequently become worn, and instead of repairing them, the tools are thrown aside. A number of such wrenches were picked up in a shop and the sockets renewed as follows: A piece of steel was ground to a square cross section of the original size of the socket, and the wrenches were heated over a forge fire. The worn edges were hammered over this core, and when the wrench was smoothed and polished, the socket end was hardened. The wrenches were as serviceable as new ones.

Sawing Wooden Wheels, or Disks, on Band Saw

It was desired to saw a considerable number of wooden disks of the same diameter, and the following method, as shown in the illustration, was used with success: The disks were to be 10 in. in diameter. A smooth board, $\frac{7}{8}$ in. thick, 8 in. wide, and long enough to reach across the table of the saw, was procured and clamped securely into place, as shown, after a nail had been driven barely through it so as to project at the center of the upper side and opposite the cutting edge of the saw. The point of the nail was exactly 5 in. from the saw. The stock was cut into square pieces of slightly more than the desired diameter. One of the pieces was placed on the board and pressed down on the nail so that it could be turned on the point. By turning the piece of wood carefully, a disk was sawed out, having a smooth circular outline. Duplicates were made quickly in the same manner.—Edwin R. Mason, Danville, Ill.



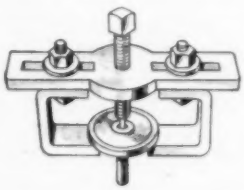
The Disks are Cut of Uniform Size without Marking Out Each Piece Separately

Shop Apron with Convenient Spring Belt

Workmen in shops, as well as other persons who must wear an apron occasionally, are familiar with the nuisance of tying and untying apron strings, especially since they are easily broken in handling heavy objects. The use of an apron with a spring of band iron at the top instead of tie strings is quite convenient. The spring is curled slightly outward at the ends and may be slipped about the body quickly. It is not easily broken, and if given the proper tension insures that the apron will remain in place.

Device for Removing Small Shafts or Arbors

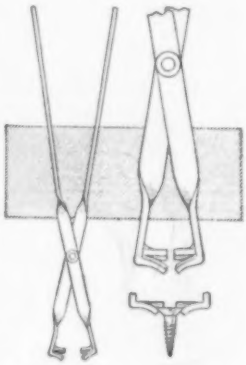
Experiencing difficulty in removing arbors and shafts from small gears and similar constructions in the workshop, I made a frame for removing them, as shown in the sketch. A piece of steel, 3 in. wide, 10 in. long, and ¾ in. thick, was provided with a ½-in. hole, at its center, tapped with a 12-gauge thread. Slots, 2½ in. long and ½ in. wide, were cut in the plate as shown, and a machine screw fitted to the threaded hole. Two pieces of steel, ½ in. thick, 1½ in. wide, and 5 in. long, were forged to a U-shape, and holes bored through their upper ends, to fit bolts clamped through the slots in the upper piece. An opening was left between the lower ends of the U-shaped pieces, and in this the gear, or other object from which a shaft or arbor is to be removed, is placed. By applying pressure on the center screw by means of a wrench, the shaft may be forced from the gear. The device may be made in various sizes.—W. C. Loy, Rochester, Ind.



¶Rivets should be cut off before being inserted into place, so that just enough metal is available for proper riveting.

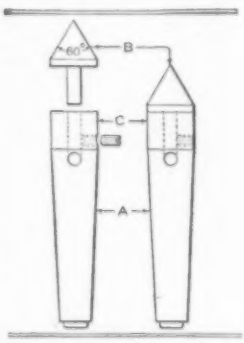
Tongs for Grasping Screws in Starting Them

It is often desired to place screws in corners where the hand cannot reach, and the device shown in the sketch was made and used successfully for this purpose. Strips of iron were twisted and forged at the ends to form tongs. The jaws were cut as indicated, and the two outer portions of each were bent down to receive the head of the screw while gripping it. It was possible by the use of this device to place screws in many places where there was barely room for a long screwdriver.



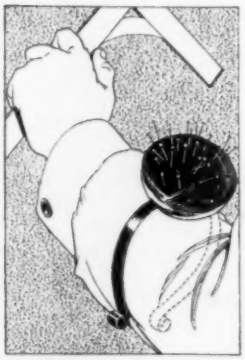
Lathe Center with Interchangeable Points

Lathe centers are frequently burned by persons inexperienced in the operation of such a machine, and occasionally even an experienced workman may have this trouble. The center shown in the sketch, with a point that is removable, was devised for use in a shop where boys were taught to operate lathes, and proved economical. It consists of two main parts: The shank A is turned to fit the taper of the lathe spindle, and the point B is turned to fit a socket in the end of the main portion. A setscrew is provided in the straight portion, C, of the shank, and a hole is drilled to make removal of the point easy. When the point is burned, it may be replaced quickly by a new one.



Arm Pincushion Carried on Bicycle Clip

A tailor devised the arm pincushion shown in the sketch so that he would have pins at hand while fitting garments or working in various parts of the shop. The device was made by fitting a pincushion into a cup and fastening it to an ordinary trouser clip worn by bicyclists. The cushion is carried on the left arm.—Mrs. Avis G. Vestal, Chicago, Ill.



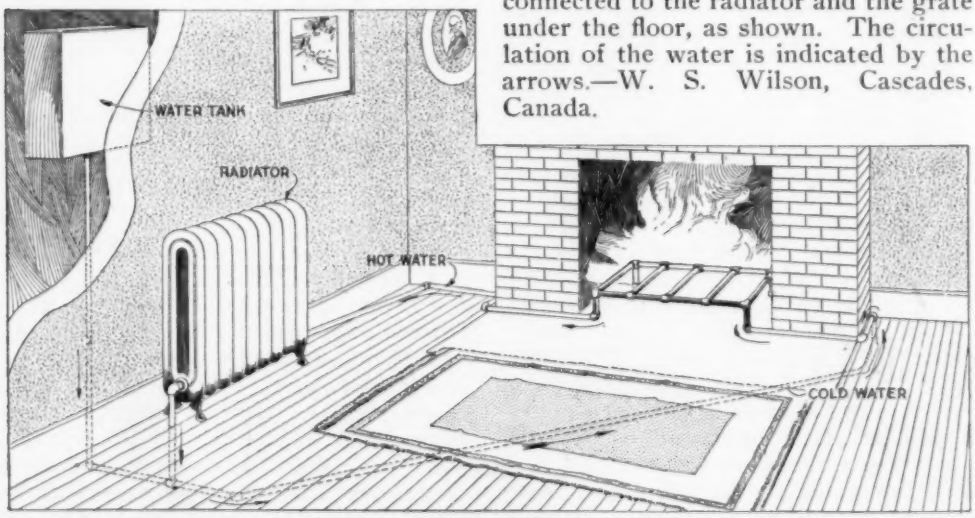
Sorting Tray for Nails, Screws, and Bolts

Instead of throwing away stray bolts, screws, and other small pieces used in the workshop, a good plan is to place them in a tray for miscellanies from which they may be sorted conveniently. A tray for this purpose may be made of a wooden or metal box, about 2 in. deep, 6 in. wide, and 12 in. long. One corner of the bottom should be provided with a small opening covered by a slide, and the upper corner above it should be covered with a triangular section. In sorting the material it is poured from the small opening into the hand and distributed into several receptacles. The triangular covering at the corner prevents the contents of the tray from spilling while being sorted.

Utilizing the Heat in a Fireplace for a Radiator

A room in which there is a fireplace is usually quite comfortable close to the fire, but is likely to be cold near the far corners, especially in cold weather when a strong wind is blowing. There is much waste heat in a fireplace, and to utilize it under such conditions, I installed the radiator and hot-water heating system shown in the sketch. The piping is ¾-in., and is connected with standard fittings.

The grate in the fireplace was made of pipe and fittings, as shown, to fit into the opening, which will, of course, vary, hence no dimensions are given. The cold-water supply was arranged in a corridor adjoining and the pipes connected to the radiator and the grate under the floor, as shown. The circulation of the water is indicated by the arrows.—W. S. Wilson, Cascades, Canada.



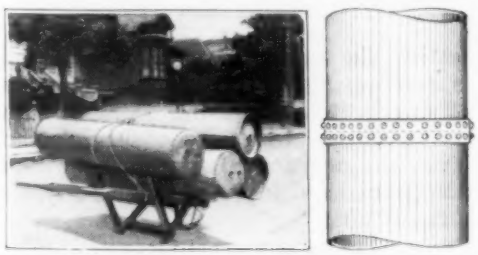
A Grate of Pipe was Built in the Fireplace and Made Part of a Hot-Water Heating System by Which Parts of the Room Remote from the Fire were Heated

Patching the Printing Surfaces of Woodcuts or Type

A method which I employ almost daily in the shop for repairing wood type, large poster wood engravings, etc., when a miscut is made, and which could be used on wood in many instances where a smooth surface is desired over a patch, is as follows: Fill the holes with hot sealing wax, and when it is cold and hard put some lubricating oil on it and rub the surface down with a piece of pumice stone. The result will be a smooth, level patch, which can be worked like the wood surrounding it.—L. L. Pazourek, Cleveland, Ohio.

Old Kitchen Boilers Used for Well Casing

A farmer made use of old kitchen boilers for well casings, thus adding another to the many uses to which these cumbersome tanks have been put. They were cheaper than the well casing he had intended to use, and, it is asserted, will last longer. The boilers were removed to a shop in a wheelbarrow, as shown in the photograph reproduced, and the ends were removed by cutting the rivets. They were then butted end on end, and a band of strap iron was riveted on them, as shown. In this form they were lowered into the well, bored by a well driller. Boilers of this type are hard to dispose of, and they were taken

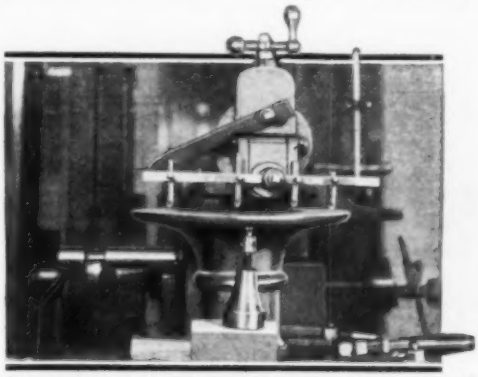


The Old Boilers were Gathered in a Dumping Ground and Used by a Farmer for Well Casings

from a city dumping ground and shipped to the farmer in sufficient number for his well.—John Hoeck, Alameda, Calif.

Gang Tool for Shaper in Machine Shop

The base of a column, which was too wide to be planed in a shaper by ordinary methods of using the machine,



The Base of a Column was Planed Satisfactorily by the Use of the Gang Tool Braced as Shown

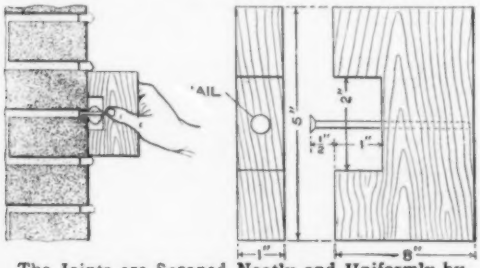
was handled satisfactorily by means of a gang tool, as shown in the photograph reproduced. The base was set up in the shaper and supported by a jack. The center of the work was considerably to one side of the center of the ram, so it was necessary to extend the tool holder farther on one side of the tool post than on the other. The base of the column was cored, and the pressure on the cutting tools was not the same during the entire length of the longest cut. In order to prevent the bar supporting the tools from springing under these conditions, the support shown was clamped behind it and fixed to the front of the ram.—Harvey Mead, Scranton, Pa.

Preventing Frosting of Auto Panes in Winter

The gathering of frost on the windshield of an automobile in cold weather is dangerous. Alcohol added to the cleansing water will aid in preventing the forming of frost. If the shield, and other windows in the car, do not need cleaning apply a coating of three parts alcohol and one part glycerin, and rub it to a polish. This is especially useful in closed automobiles, and may be applied to show windows.

Scraper for Joints in Brickwork

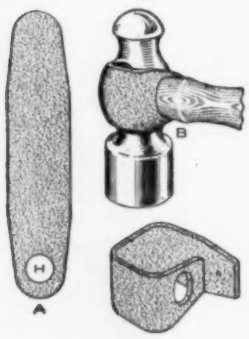
Scraped joints are in general favor for brickwork, and the best appearance results only when the joints are uniform in depth. The tool shown in the sketch affords a simple means of gauging and smoothing the joints. It is made of a block of wood, 1 by 3 by 5 in., notched at one side, and having a 16-penny common nail driven into it at the notch. It is used in scraping the joints, as shown in the sketch at the left.—Ernest Greenhalgh, Indianapolis, Indiana.



The Joints are Scraped Neatly and Uniformly by Means of the Homemade Scraper

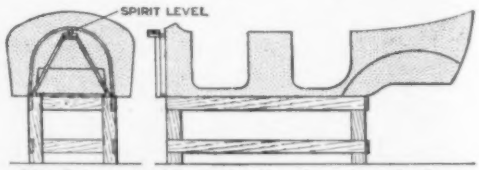
A Soft-Face Hammer

It is frequently desirable, when it is necessary to pound soft metals like brass or finished metal work, to use a hammer which has a soft face, that is, a face which will not damage or mar the surface pounded. Hammers with babbitt-metal heads are regularly manufactured for this purpose and are very convenient, but an improvised soft-face hammer can easily be arranged as suggested in the sketch. First a piece of leather belting is cut as shown at A. The strip is arranged on the hammer head as shown at B. The hole H must be large enough so that the hammer handle will slip through it. The leather protective strip is fastened by driving a tack through the leather and into the hammer handle. When pounding on objects that should not be marred, the blow is delivered with the side of the hammer head protected with the leather.



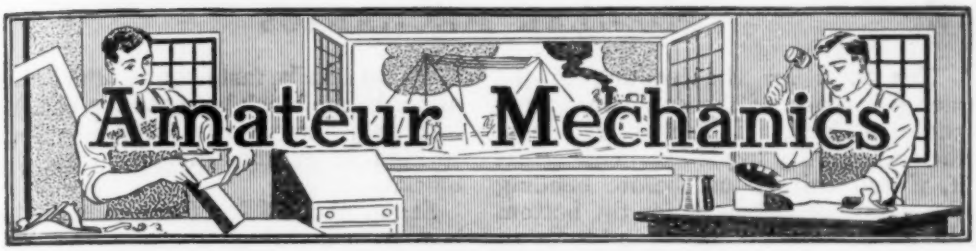
Gauging Automobile-Body Dashes

In assembling sheet-metal shrouds on wooden frames of automobile bodies, trouble was experienced in setting the dash at right angles to the bottom of the body. As the dash is part of the shroud, the latter was clamped in place, and then tested for alinement with a large try-square, its perpendicular edge set against the dash. This method required considerable time and, especially on piece work, proved unsatisfactory. The problem was solved by having all the assembling forms carefully planed up and leveled. Then a triangular frame was made, with three pins of the same length projecting out on one side at each of its corners. The top edge of this frame was carefully made at a right angle to the plane of the pins, and then a small spirit level was fastened to it, as shown in the sketch. In testing the dash, the triangular frame is held up against it, two of the pins at the bottom, and the third in the center at the top. By observing the level, the position of the dash may be determined quickly, and proper adjustment made.



The Triangular Frame is Placed against the Dash and the Test for Alinement Made

¶Before putting on a tire casing, wipe it out carefully with a moist rag, to insure that the inner tube will not be damaged by dirt or sand lodged in the casing.



Making a Coasting Toboggan

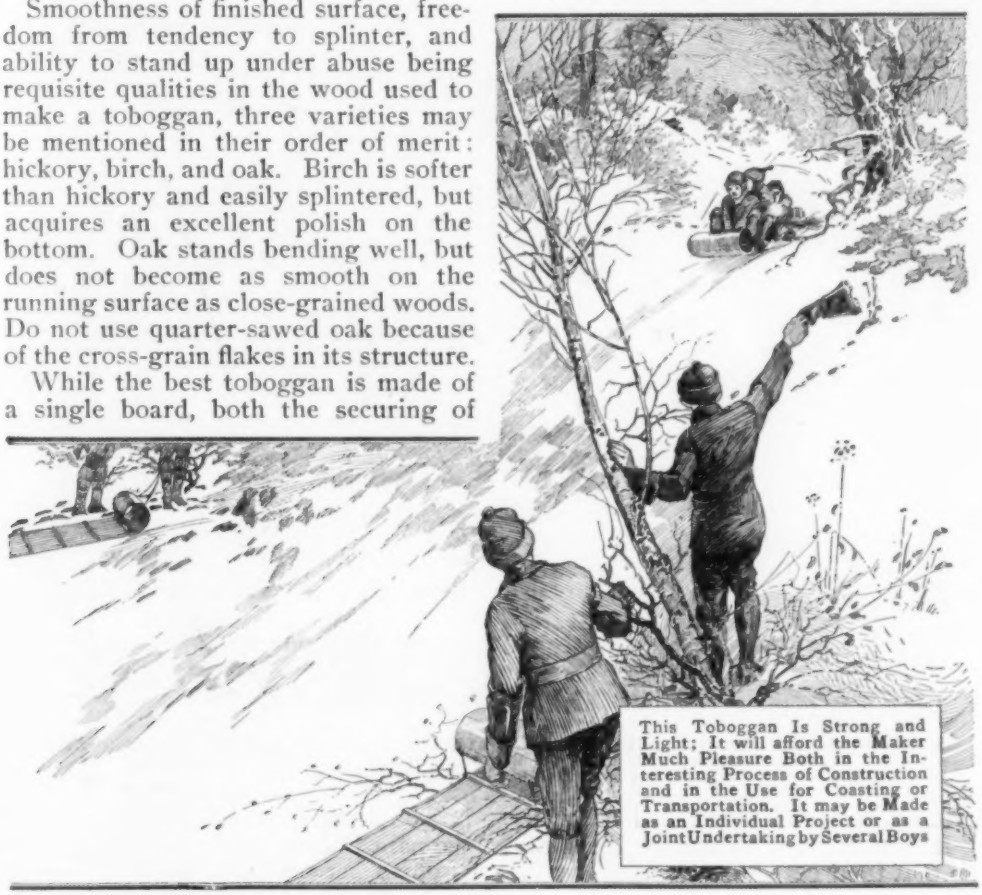
By A. M. PARKER

ESSENTIALS of a good toboggan, whether for coasting or use in transportation, are strength and lightness, and when it is to be made in the home shop, the construction must be simple. That shown in the illustration, and detailed in the working sketches, was designed to meet these requirements. The materials for the toboggan proper and the forms over which it is bent, may be obtained at small expense.

Smoothness of finished surface, freedom from tendency to splinter, and ability to stand up under abuse being requisite qualities in the wood used to make a toboggan, three varieties may be mentioned in their order of merit: hickory, birch, and oak. Birch is softer than hickory and easily splintered, but acquires an excellent polish on the bottom. Oak stands bending well, but does not become as smooth on the running surface as close-grained woods. Do not use quarter-sawed oak because of the cross-grain flakes in its structure.

While the best toboggan is made of a single board, both the securing of material and its construction are rather difficult. Narrow strips are easily bent to shape, but do not make a durable article. A toboggan made of four boards is practical. The mill bill for one 7½ ft. long by 16 in. wide and for the bending frame, is as follows:

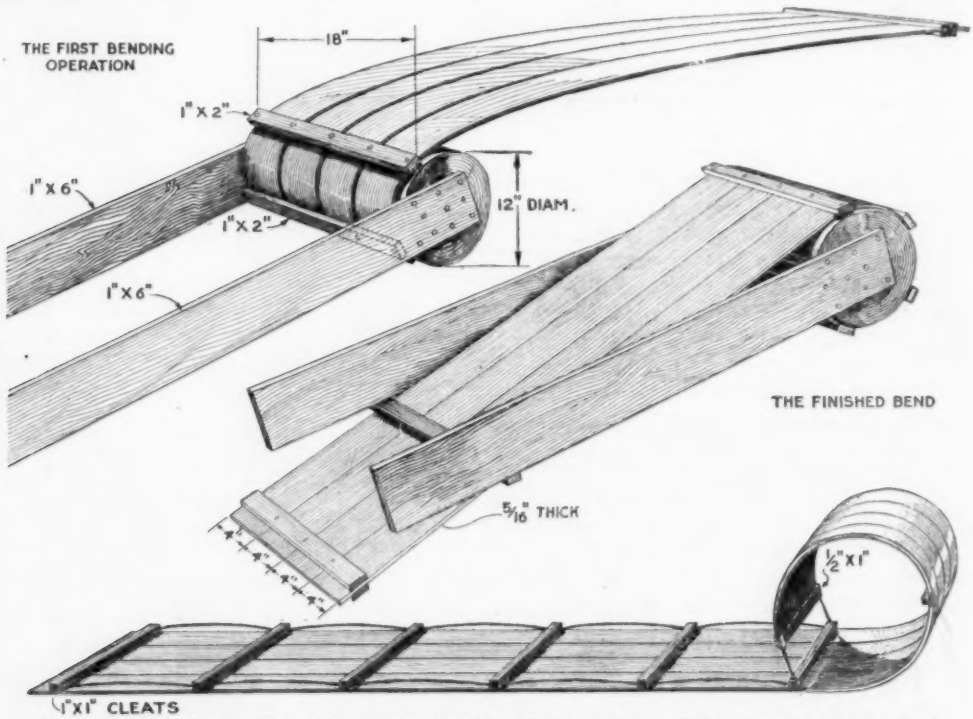
4	pieces,	5/16	by 4 in.	by 10 ft.,	hard wood.
7	"	1	by 1 in.	by 16 in.,	" "
2	"	½	by 1 in.	by 16 in.,	" "
2	"	1	by 6 in.	by 6 ft.,	common boards.
6	"	1	by 2 in.	by 18 in.,	" "
1	cylindrical block, 12 in. diameter by 18 in. long.				



This Toboggan Is Strong and Light; It will afford the Maker Much Pleasure Both in the Interesting Process of Construction and in the Use for Coasting or Transportation. It may be Made as an Individual Project or as a Joint Undertaking by Several Boys

The form for the bending of the pieces is made of the common boards and the block. A block sawed from the end of a dry log is excellent. Heat it, if convenient, just before bending the strips. The boards for the bottom should be selected for straightness of grain and freedom from knots and burls. Carefully plane the side intended for the wearing surface, and bevel the edges so that, when placed together, they form a wide "V" joint, half the depth of the boards. The 1 by 1-in. pieces are for cross cleats and should be notched on one side, 1 in. from each end, to receive the side ropes. The two ½ by 1-in. pieces are to be placed one at each side of the extreme end of the bent portion, to reinforce it.

Bore a gimlet hole through the centers of the 1 by 2 by 18-in pieces, and 4¼ in. each side of this hole, bore



The Boards for the Bottom are Steamed or Boiled at the Bow Ends and Bent over the Form. As the Bending Operation Progresses, the Boards are Nailed to the Form with Cleats, and Permitted to Dry in This Position

With 3-in. nails, fasten one of the bored pieces to the block between the boards, inserting, temporarily, a ½-in. piece to hold it out that distance from the block.

Steam about 3 ft. of the ends of the boards, or boil them in a tank. Clamp, or nail, the boards together, at the dry ends, edge to edge, between two of the 1 by 2-in. pieces, leaving about ¼-in. opening between boards. Thrust the steamed ends under the cleat nailed on the block, the nails which hold it slipping up between the boards. Bear down on the toboggan carefully, nailing on another of the bored cleats, when the toboggan boards have been curved around the block as far as the floor will permit. The nails, of course, go between the boards.

Now, turn the construction over and bend up the toboggan, following the two others. Nail the end of one of the 6-ft. boards to each end of the block, so that their extended ends are parallel. boards around the block with more of the nailed cleats, until the clamped end is down between the two 6-ft. boards,

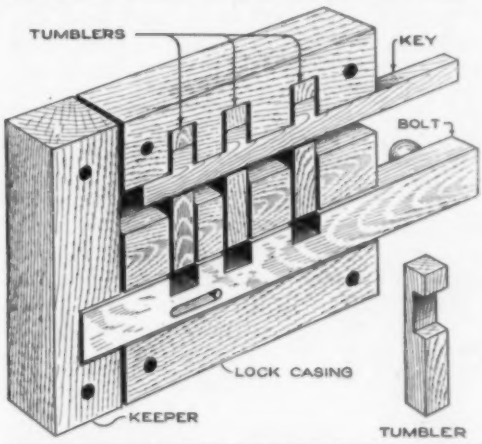
where it can be held by a piece nailed across. More of the cleats may be nailed on if desired; in fact, the closer together the cleats are the less danger there is of splintering the boards, and the more perfect the conformity of the boards to the mold.

Allow at least four days for drying before removing the boards from the form. Clamp the ½ by 1-in. pieces one each side of the extreme ends of the bent bows, drill holes through, and rivet them. A 1 by 1-in. crossbar is riveted to the inside of the bow at the extreme front and another directly under the extremity of the curved end. These cleats are wired together to hold the bend of the bow. The tail end crossbar should be placed not nearer than 2½ in. from the end of the boards, while the remainder of the crossbars are evenly spaced between the front and back pieces, taking care that the notched side is always placed down. Trim off uneven ends, scrape and sandpaper the bottom well, and finish the toboggan with oil. Run a ⅜-in. rope through the notches under the ends of the cross pieces, and the toboggan is completed.

Screws are satisfactory substitutes for rivets in fastening together the parts, and wire nails, of a length to allow for about ¼-in. clinch, give a fair job. Indians overcome the lack of hardware by the use of rawhide, laced through diagonally staggered holes bored through the crosspieces and bottom boards. Rawhide, which they sometimes stretch over the bow as a protection, affords an opportunity for elaborate ornamentation.

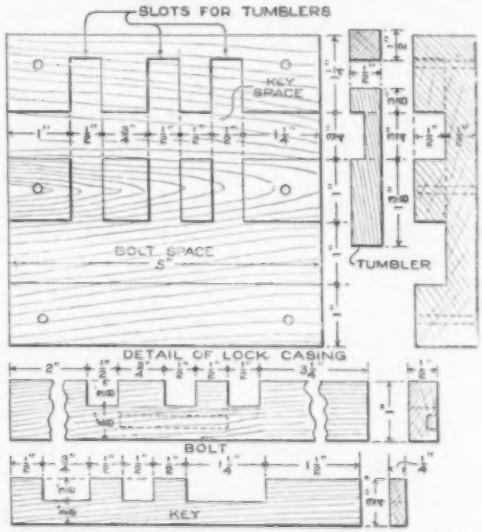
Wooden Lock with Combination Key

The lock shown in the sketch and detailed drawings is made entirely of wood, and it is nearly impossible to pick or open it without the use of the key. The casing of the lock is 5 by 5 in. and 1 in. thick, of hard wood, oak being suitable for this as well as for the other parts. Three tumblers, a bolt, and a keeper are required. The key is shown inserted, indicating how the tumblers are raised by it. The bolt is slotted and a screw placed through it to prevent it from being moved too far. The lock and keeper are bolted into place on a door with carriage bolts, the heads being placed on the outer side.



This Lock is Made Entirely of Wood and cannot be Picked Easily

The detailed drawing shows the parts, together with the dimensions of each, which must be followed closely.



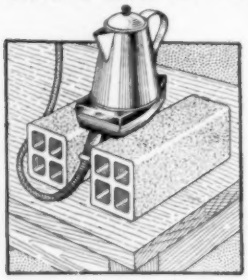
The Details of Construction must be Observed Carefully and the Parts Made Accurately to Insure Satisfactory Operation

The lock casing is grooved with two grooves, extending the length of the grain and connected by open mortises,

all ½ in. in depth. The spacing of the mortises and the grooves is shown in the views of the casing. Three tumblers, ½ in. square and 2½ in. long, are required. The bolt is ½ by 1 by 8 in., and the key ¼ by ¾ by 5½ in., and notched as shown. All the parts of the lock must be fitted carefully, sandpapered smooth, and oiled to give a finish that will aid in the operation, as well as protect the wood. Aside from its practical use, this lock is interesting as a piece of mechanical construction. —B. Francis Dashiell, Baltimore, Md.

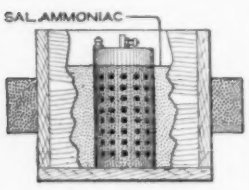
Variety of Uses for an Electric Iron

A milliner, in addition to using her electric iron for ordinary purposes of ironing and pressing, inverts it between two hollow tiles and thus makes use of it in steaming velvet trimmings. The tiles not only hold the iron securely in this position, but also insulate it from overheating or scorching adjoining objects or surfaces. The iron is also used inverted for heating water, cooking coffee, and other liquids, as well as in providing a warm lunch.



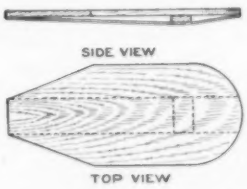
Renewing Dry Batteries with Sal Ammoniac

Finding that dry batteries had increased in price, and requiring a number for experimental purposes, I devised the following method by which I was able to use the old batteries for a considerable period: When the dry cells were nearly exhausted, I punched holes through the zinc covering with a nail, as shown in the sketch. The holes were placed about 1½ in. apart, and care was taken not to punch them near the upper edge of the container, or the black insulation might thus be injured. The cells were then placed in a saturated solution of sal ammoniac. The vessel containing the liquid must be filled only to within ½ in. from the top of the cell, otherwise the binding posts will be corroded, and the cell probably short-circuited. The cells were left in the solution six hours, and then became remarkably live. They must not be connected or permitted to come into contact with each other while in the solution.—H. Sterling Parker, Brooklyn, N. Y.



A Sliding Board for Coasting

The simple device shown in the sketch can afford youngsters much amusement in coasting down inclines or small hills, either on the snow or on surfaces slightly crusted with ice. The board is intended for individual use only and should be about 10 in. wide and 26 in. long. It is reinforced underneath by a strip of wood, about ¼ in. thick and smoothed on its lower side. This piece is fastened in the form of a bow by placing a small cleat between it and the upper piece. The strip should be about 3 in. wide, and aids in keeping the sliding board in its course.—John F. Long, Springfield, Mo.



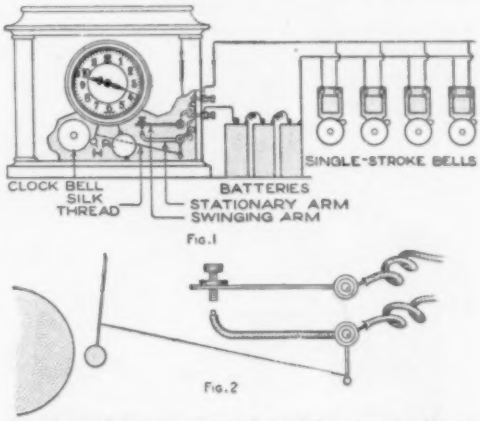
Electrical Device Transmits Striking of Clock

Converting an ordinary parlor, or mantel, clock into a master clock, from which the striking of the gong is transmitted to various parts of the home, may be accomplished by fitting it with a simple electrical device, as shown in the sketch. The general arrangement of the batteries, single-stroke bells, and

the contact device within the clock case is shown in Fig. 1; a detail of the silk cord and other connections of the contact key and the gong hammer, is shown in Fig. 2. This arrangement has been in operation for several years, and has been found practical.

The various rooms to which the striking of the gong is to be transmitted are wired with No. 18 annunciator wire, run carefully behind picture moldings and in corners. Where the wires must be carried through a partition, a ¼-in. hole is sufficiently large for the purpose. The single-stroke bells are wired up as shown in the sketch. The number of dry batteries necessary varies with the number of bells in the circuit, and also depends on the length of wire through which the current is carried. A trial should be made with several batteries and more added until the bells are rung properly.

The connecting device may be fitted into the clock case without defacing it by boring holes in its side, and the binding posts are fixed into place neatly. The two sections of the contact key, shown in detail in Fig. 2, are fastened to the back of the clock case with bolts. The upper member is fitted with an adjustable thumbscrew and is stationary on the bolt fastening. The lower arm is made of covered wire and is pivoted on the supporting bolt. Attached to its lower edge, at the pivot, is a small lever arm. This is connected to the hammer rod of the gong with a silk cord. The length of the cord must be determined by careful adjustment so that it will not hinder the action of the hammer H, but will bring the swinging arm into proper contact with the thumbscrew. The contact should be made at the instant the hammer strikes the bell. The contact of the platinum point of the thumbscrew and the swinging arm must be close, but not too strong. Metal posts or tubes fitted over the bolts, at the points where the arms are attached to the back of the clock case, may be used to bring the arms the proper distance forward in the case, so that they will be in alinement with the hammer rod. The silk cord must not interfere with the action of the pendulum P. To hold



The General Arrangement of the Apparatus for Transmitting the Striking of a Clock Gong is Shown in Fig. 1, and a Detail of the Contact Device in Fig. 2

the silk cord in place on the hammer rod, drop a small piece of melted sealing wax or solder on the rod.—W. E. Day, Pittsfield, Mass.

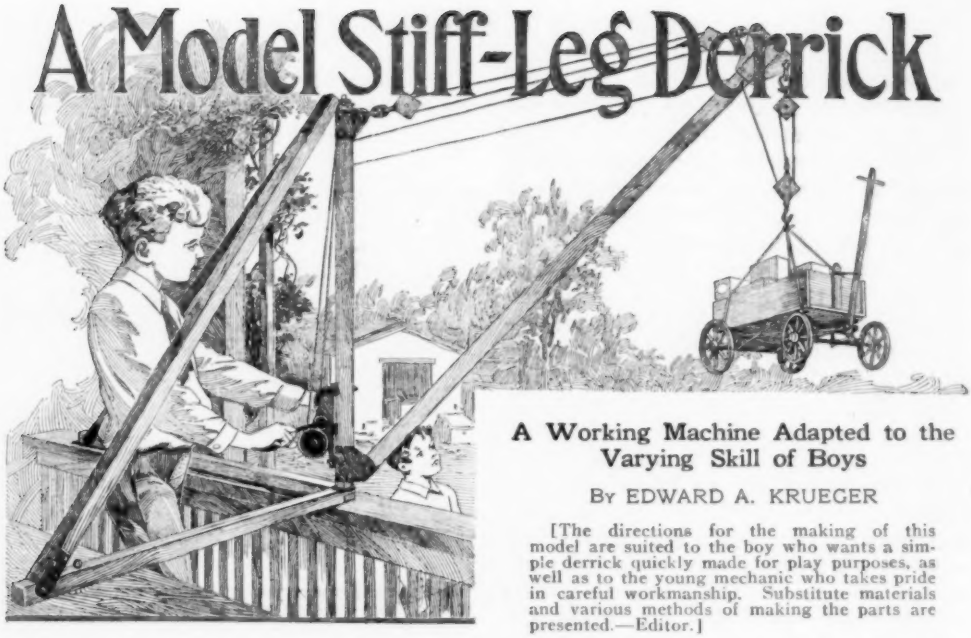
Antique Signboard Made of Headboard of Bed

Some old headboards of beds are of such a pattern that they lend themselves readily for use as signboards, with only slight alteration. Such an adaptation is shown in the sketch, and was fitted to a bracket of ornamental iron, the whole producing a striking effect. The sign was made of black walnut and was, by reason of its age,

A Signboard Which Attracts Attention was Made of the Headboard of a Walnut Bed

well seasoned. It was treated with several coats of linseed oil to withstand the action of the weather better.

A Model Stiff-Leg Derrick



A Working Machine Adapted to the Varying Skill of Boys

By EDWARD A. KRUEGER

[The directions for the making of this model are suited to the boy who wants a simple derrick quickly made for play purposes, as well as to the young mechanic who takes pride in careful workmanship. Substitute materials and various methods of making the parts are presented.—Editor.]

A HUGE derrick handling heavy objects seldom fails to attract attention, if it is within range of passers-by. To the boy it has a special appeal, whether perched hundreds of feet above the street on a skyscraper skeleton, lifting whole wagon loads of dirt from a deep excavation, raising heavy blocks of stone from a seemingly bottomless quarry, moving logs from a ship like cordwood, or hoisting a great black boiler as if it were a tin can. The real boy admires power and skill applied on large jobs. He looks forward to the time when he can take part in great building and construction projects. The derrick in its many forms is typical of this big work.

While a boy cannot join directly in such activities, he can, with the aid of his friends, tackle big jobs of his own, as a "contractor," "builder," or "engineer." He may make his miniature derrick and with it do real work, that is extremely interesting play. The model derrick shown in the illustration was designed for this purpose. It is operated by hand, and known as a stiff-leg derrick. The details of its construction are not exact duplicates of those used on large derricks, but are adapted from them, to be within the constructive ability of boys.

The parts can be made without the use of machinery or tools other than those in nearly every boy's workshop. The description and discussion of the construction and uses of the derrick are suggestive as well as definite. If a boy uses the suggestions presented to invent methods of his own, to use new and possibly better materials, and especially to devise interesting and original jobs on which to do work with the derrick, he will get far more benefit, as well as fun, than by merely making the model in detail as described.

However, the boy who does not have even ordinary tools and who cannot work out the parts as shown, may make a derrick that will work by using material available. Suggestions for some of these are given in this article. All of the fittings are not essential in a small model, though they should be made if possible. Likewise, the method of construction may be simplified, as outlined in the detailed description of the parts.

Typical uses of derricks on actual big construction jobs are shown in the three reproductions of photographs. They are of the stiff-leg type, though not alike in detail. That shown in Fig. 1, handling stone at a quarry, is operated by a steam drum engine, and has a

bull wheel by which it is turned. Dirt from a tunnel excavation under a street is being handled by the derrick shown in Fig. 2. The huge steel derrick, shown in Fig. 3, illustrates the use of built-up steel beams in a stiff-leg derrick for the handling of very heavy structural members.

Before beginning the construction of the model it is necessary that the general arrangement of the parts be understood. The headpiece shows these clearly. The two larger sketches in the page plate show the derrick with the boom extended directly in line with one side. The side elevation shows the lengths of the wooden beams and the arrangement of the parts as viewed from the side. In the front elevation, the middle portion of the boom is cut away to show the pulleys and fittings at the top of the mast.

The construction should begin with the getting out of stock for the beams, all of which are 1-in. square in section. A fine straight-grained hard wood, like maple or birch, is best for a high-grade model, but other woods—oak, ash, hickory, or even softer varieties—free from knots and defects, are suitable. Cut the beams to length, as shown in the side elevation: boom, 3 ft. 8½ in.; two sills, 2 ft. 1 in.; two stiff legs, 2 ft. 7 in.; mast, 1 ft. 9¾ in. Note that the lower ends of the stiff legs are butted against the upper surface of the sills and cut at an angle.

To insure that all the parts will fit properly, a good plan is to make a full-size drawing of the side elevation on a large sheet of wrapping paper. The parts may then be fitted directly to the drawing. Patterns may be made of paper for each of the metal fittings. In order to avoid confusion, the crab, pulleys, and rigging need not be placed on the drawing until the beams and the metal fittings have been made. This method will save time, especially for workers not thoroughly familiar with detail drawings.

Fit the sills together with a half-lap joint, at A, in the side elevation. This is covered and held together by a bearing plate, B. This, like all the metal side plates and similar fittings, is made of sheet metal 1/32 in. thick. Sheet iron is suitable and readily obtained from old cans, bands of tubs, or cut

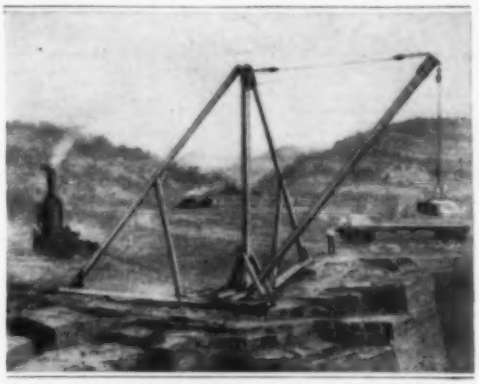
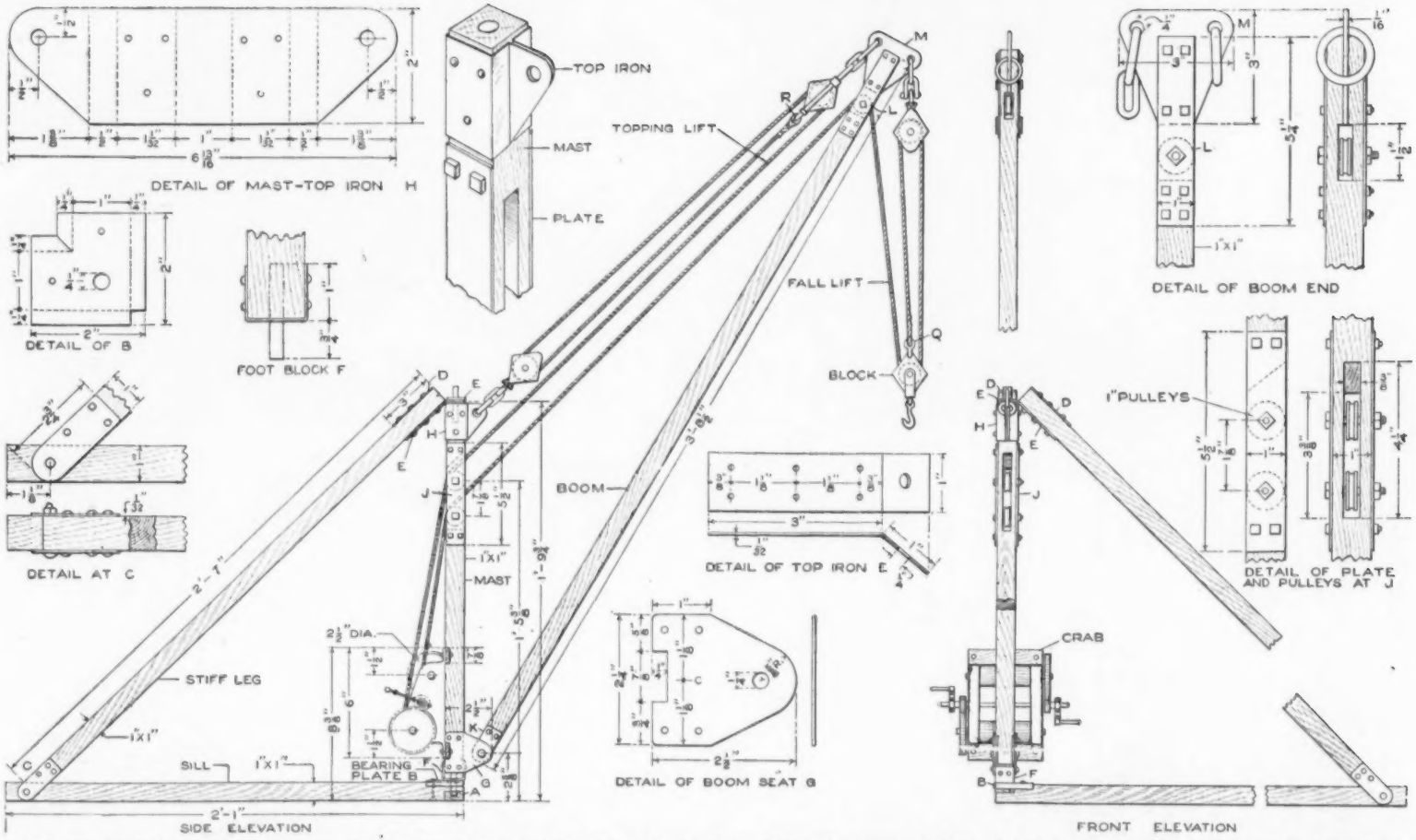


Fig 1. Lifting Stone from a Quarry: The Boom is Slewed by Means of the Bull Wheel and Rope Drive Connecting It to the Steam Hoist; Grabhooks Grip the Load

from new stock. The arms of the bearing plate B, like other supporting plates, are as wide as the beams. To make the plate, cut a 2-in. square of the metal and cut out a ¼-in. and a ½-in. square at opposite corners, as shown in the detail sketch. Drill a ¼-in. hole for the lower pin of the mast in the center of the corner portion, and drill or punch holes for bolting it. Make

Fig. 2. Handling Dirt from a Tunnel Excavation: The Use of a Platform and the Tip Bucket Are Suggestive

the diagonal cut at the inner corner. Mark the dotted lines and bend the plate into shape over a hard square-cornered wood block, or a metal block.



The Front and Side Elevations Show the General Arrangement of the Parts with the Boom Extended Directly in Line with One Side. The Main Parts are Designated by Names in General Use. The Chief Details of the Structure Proper are Shown in the Large-Scale Sketches

Slight allowance is made for the thickness of the metal in bending it. The lower pin of the mast extends nearly through the joint, and aids in steadying it. Simpler methods of making this fastening at the joint are to fit a flat angle plate over the joint, or fasten the latter with two screws and place a washer around the pin of the mast.

The four plates C, by means of which the stiff legs are bolted to the sills, should be made next. Cut them 1 by 2¾ in., and round off the lower ends. Drill, or punch, 3/32-in. holes for the bolts, and ⅛-in. holes for the fastening bolt near the rounded end. Next make the two flat plates D, and the two top irons E, for the stiff legs. The plate D is 1 by 3-in., with holes, as indicated, for the top iron E, in its 3-in. section. The top irons are cut 1 by 4 in.; a ¼-in. hole is drilled in the center of the 1-in. end, to receive the top pin of the mast, and the end is bent to fit the angle of the stiff legs.

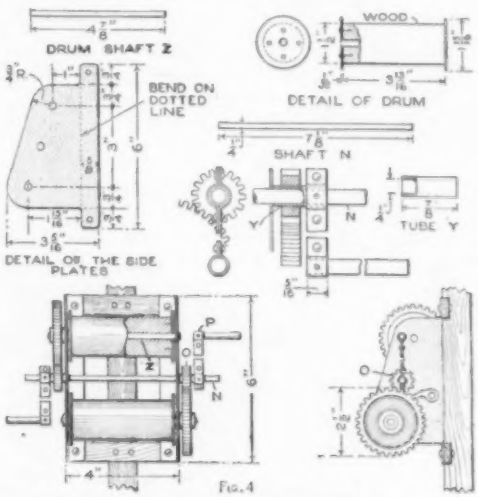
The foot block F is bent from a strip, 1 by 3 in. A ¼-inch hole is drilled in the center, for the pin of the mast. Holes are made for screws, by which it is fastened into place. The plates for the boom seat G are cut from pieces, 2¼ by 2½ in. Cut out the ¼ by ⅞-in. portion at the left to receive the lower brace of the crab. These parts may be made of slightly heavier metal, as they must stand considerable strain.

The mast-top iron H is bent from a piece, 6 13/16 in. long and 2 in. wide. Allowance is made for the thickness of the metal, so that the square section will fit closely around the 1-in. square mast. This is shown in the sketch of the piece in place. The iron is fixed into place by means of bolts. The ¼-in. holes for the chain, attached to the block near the iron H, should be drilled through both pieces at once, after the metal has been bent into shape. The side plates J, for the pulleys in the mast, are 1 by 5½ in. and drilled as shown. They are not essential, but provide a strong support for the axles on which the pulleys are mounted.

The lower end of the boom is fitted with two plates, K, 1 by 2 in., with ¼-in. holes to fit the pivot pin, and sunk flush with the sides of the boom. The two side plates L, on the upper

Fig. 3. Seventy-Five Ton Girder Handled by Steel Derrick: Twenty-One Parts of Line are Used with Double Blocks in the Load and the Boom Lifts

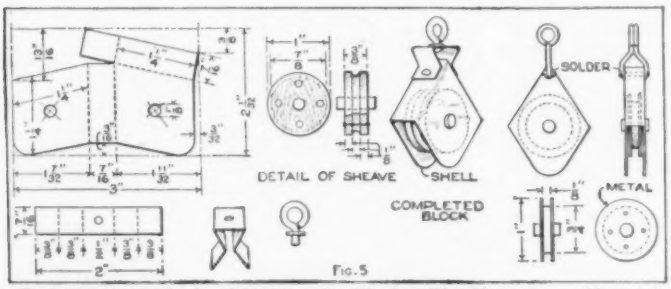
end of the boom, are 1 by 5¼ in., as shown in the detail sketch of the boom end. The boom-end iron M is cut from a 3 by 3-in. piece of sheet metal, and should be at least 1/16 in. thick.



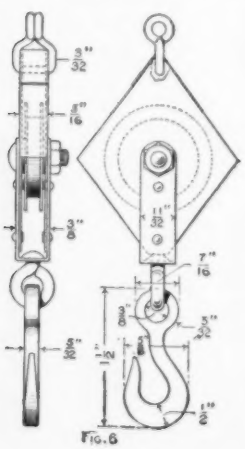
Details of the Hoisting-Drum Mechanism, or Crab: By Setting the Gears Properly Both Drums may be Operated Together

The preliminary fitting together of the beams and the fixing of some of the

fittings into place may be undertaken when these parts are made. Bolt the bearing plate B into place, and bore the ¼-in. hole for the lower pin of the mast. The bolts used are similar to those used in fastening the other plates and fittings. On commercial derricks they are usually square-head, but these are difficult to obtain in small sizes. Since it is intended that the derrick is to be set up and taken down, like large derricks, in moving them from job to job, bolts must be used for some of the fastenings. Where the part to be fastened need not be removed in "knocking down" the derrick, rivets may be used. The bolts should be 3/32 in. in diameter, of steel or brass, like those used in electrical work. They should be 1¼ in. long, round-head, slotted, or hexagonal head, so that they may be gripped in tightening up the nuts. Screws and escutcheon pins are possible substitutes.



Two Simple Methods of Making the Blocks: The Sheaves are Made of Wood or Metal; the Shells Are of Metal Fitted to the Sheaves



Cut the lower ends of the stiff legs to the proper angle and bolt the plates C into place. Then put on the stiff-leg top irons D and E. Before putting on plates for the mast, cut the slot for the pulleys, at J. It is 3/8 in. wide and 4¼ in. long. Fit the foot block F, the boom seat G, the mast-top iron H, and the plates J into place. Bore ¼-in holes in the ends of the mast and drive the pivot pins into them about 1 in., permitting them to project ¾ in. Cut the pulley slot, 3/8 by 1½ in., through the boom, at L. Put the plates K and L and the boom-end iron M into place. The beams may now be assembled, to test the fittings, and then taken down for greater freedom in completing the details. Drill ⅛-in. holes for the removable pins or bolts at C and K, and at the bearings for the pulleys in the mast and boom.

The pulleys in the mast and boom are 1 in. in diameter and ¼ in. thick. They may be made by either of the methods shown in Fig. 5, and explained in connection with the block sheaves. If preferred, small pulleys may be purchased or taken from old machinery. The pulleys turn on ⅛-in. bolts as axles. Those in the mast are set 1⅞ in. from center to center.

The making of the crab should next be undertaken. Its position on the mast is shown in the side and front elevations. It is supported on a frame made of two wooden strips, ¼ by ⅞ by 4 in., and two metal side plates. The plates are riveted to the strips, which are sunk into the mast, as shown in the detailed sketch, Fig. 4, and bolted to it. The crab is of the double-drum type, permitting the hauling in or releasing of the ropes independently for the boom or the load. The drums are driven by means of cranks and gears, the latter being thrown in or out of mesh by sliding the small gear, or pinion, on the center shaft N. The pinion O is set on a tube, as shown in the detail sketch. The tube is fixed to the crank P, which is made of a strip of sheet metal. By placing a pin through the handle and the shaft N, when both pinions are in mesh, the ropes may be wound on both drums at the same time.

The parts of the crab must be made carefully. The gears may be obtained from old machinery or purchased from dealers in model-maker's supplies. The drums are of wood, the ends being metal disks. In order to simplify the construction of the crab, the drums may be turned by means of cranks fixed to their shafts, without the use of gears.

Suggestions for the making of blocks, with wooden or metal sheaves, are shown in Figs. 5 and 6. The shells are made similarly, that for the metal sheave being of less thickness. The layout for the metal bent to form the shell is shown at the left. Cut a piece $2\frac{1}{32}$ by 3 in., and mark out the outline as indicated. Bore holes for the sheave axle at the centers of the sides. Bend the piece as indicated by the dotted lines, and solder the open corners at the top. Make the strap of metal $\frac{7}{16}$ by 2 in., fold it as shown, and rivet the eye to it. Rivet the strap to the shell. Build up the wooden sheave 1 in. in diameter, of three $\frac{1}{8}$-in. sections; fit it into place, and rivet the axle into the shell. The other type of block is made as shown, the eye being bent of wire and soldered into the upper corner of the shell. Blocks may, of course, be purchased, or various substitutes made from wheels available in the boy's workshop.

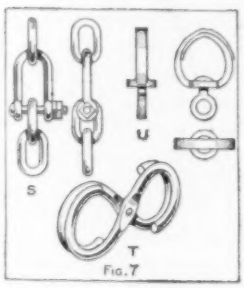


Fig. 7

The blocks Q and R, to which the ends of the rope are attached, are similar to those described, but must be provided with an eye at each end. A detail of a block for this purpose, with a load hook, is shown in Fig. 6 and at R another type is suggested. A U-shaped strap is fitted to its lower end, and a swivel eye is riveted to the strap. This permits the hook to turn with the load without twisting the rope. The hook is cut from $\frac{1}{8}$-in. sheet metal, the center opening and the eye being drilled out. Substitutes for it may be made from heavy wire.

In order to join the blocks, chains, and other fittings of the hoisting

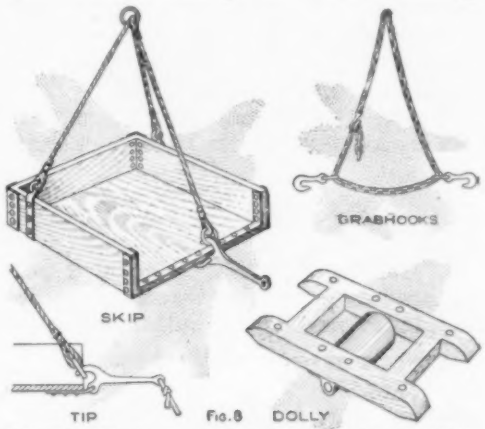


Fig. 8

The Grab Hooks are Used with Chains in Handling Steel, Blocks of Stone, and Various Heavy Objects; the Trip Skip for Dirt and Bulk Material, and the Dolly in Bringing Certain Loads within Range of the Derrick

tackle, so that they may be taken apart quickly, the shackle S, shown in Fig. 7, is useful. It is made of $\frac{3}{32}$-in. wire, and should be about $\frac{3}{4}$ in. long. The double-S link T is useful in joining chains temporarily. A swivel, U, made by bending up a strip of sheet metal and riveting an eye to a widened portion at its middle, is also shown.

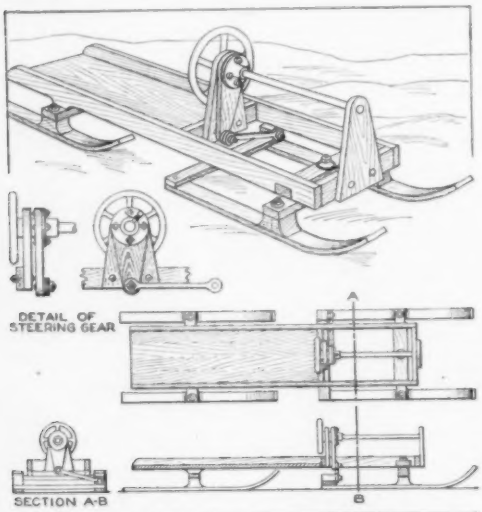
The necessary fittings being made, the derrick may be assembled completely and the ropes secured to the eyes in the blocks Q and R. Plumb line of about $\frac{3}{32}$-in. diameter, or other strong cord, is suitable. Reeve the ropes through the blocks and pulleys of the topping, or boom lift, and the fall, or load lift, as shown in the side elevation; fasten their free ends to the proper drums, and the derrick is ready for work. For handling loads of considerable weight, it is desirable to secure the ends of the sills, or weight them. The boom is turned or "slewed" by means of a rope attached to the load to steady it, or to the boom. Interesting tests may be made in the handling of various loads by the use of blocks having two or more sheaves, or by the use of double blocks, for handling very heavy loads, as shown in

Fig. 3. The same power applied on the drum raises heavier loads when more strands of rope are used between the multiple-sheave blocks. The exact relation of the power to the weight and number of strands may be determined by test, and is outlined in texts or handbooks on mechanics.

Special equipment for handling various kinds of materials and objects with a derrick is useful. Several typical devices are shown in Fig. 8. Blocks of stone are handled with grab hooks, or with keys set into a dovetail hole in the stone; girders, logs, lumber, etc., with chain or rope slings; dirt, crushed rock, etc., in trip buckets or trip skips. Other equipment may be devised readily for special purposes by observing derricks in use.

Horizontal Steering Gear for Bobsled

A steering gear for a bobsled set horizontally like the wheel of some aeroplanes and racing automobiles is



Turn the Wheel Slightly and the Runners are Turned Correspondingly by the Arm and Lever Fixed to the Rear Brace

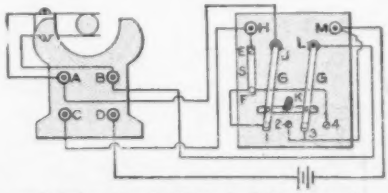
shown in the illustration. It may be made almost entirely of wood with metal fastenings, or metal may be used for the levers controlling the action. The frame may be covered with sheet metal or thin wood to resemble the front of an automobile.

The steering wheel is mounted on a shaft set in two supports. The shaft is connected to a vertical arm by means of a pipe flange. The lower end of the arm is connected to the rear brace of the front runners by a link of sheet iron, or of iron rod, bolted to the arm. The other details of the sled are suggestive only and the device may be adapted to many types of sleds. The king-pin on which the sled pivots is a bolt set through the forward brace. When the wheel is turned slightly the action is communicated to the arm and the lever, turning the runners correspondingly.

Reversing Switch for Toy Motor

The switch shown in the diagram was found satisfactory for reversing a toy motor at a distance, in connection with toys and constructions used by boys. The motor may be fixed to the electrically operated model, and the switch placed where convenient. The motor brushes are wired to the terminals A and B, which are small brass bolts and nuts. They must be insulated with thin washers of mica, fiber, or hard rubber. The field wires are fastened to terminals C and D.

The switch shown may be made of wood or fiber. The levers G are of brass, fastened together loosely with a strip of fiber, K. The contact strip S is of brass, and is secured at F, not touching the small bolt at E. Points 1 and 4 are wired to F, and E is wired



Toys and Other Small Electrical Constructions may be Reversed from a Distance by the Use of This Switch

to terminal H. Points 2 and 3 are wired to terminal M.

In wiring the switch to the motor,

terminal H is wired to the field terminal C. Terminals J and L are wired to the brush terminals A and B, respectively. Field terminal D and terminal M are wired to the batteries, or to the transformer. To reverse the motor, move the levers G to the points 2 and 4. Then press point E of the contact strip S, to close the circuit. If the switch block is made of wood or fiber, the nuts and wiring may be countersunk on the bottom of the block, and covered with sealing wax.—S. Paine, Kansas City, Mo.

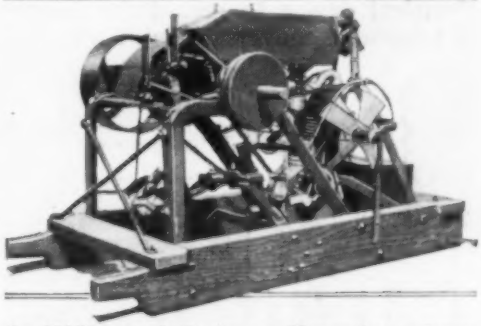
Motorcycle Engine Adapted as a Stationary Motor

Desiring a light, inexpensive, and reliable stationary engine, I procured an old 4-hp. motorcycle power plant and frame. Mounted on a strongly built base, and supported as shown in the photograph reproduced, it gave complete satisfaction. It served all ordinary purposes of a stationary engine, and was adapted to many other uses.

The engine was mounted in the loop portion of the motorcycle frame, and this was supported in an iron framework, fixed to hardwood skids, and strongly cross-braced. A 1-in. countershaft, having babbitt bearings, was fixed to the upper part of the framework, and carries a 36-tooth sprocket, driven directly from the engine shaft by a cycle drive chain. A starting crank engages a lug on one end of the countershaft, and on the other end are keyed two sizes of belt pulleys, affording two speeds. The motorcycle fuel tanks are supported on the upper part of the frame, as shown.

The motor is provided with a governor driven from the countershaft by a small belt. The tension of the governor spring is controlled by a lever, and by means of it various engine speeds may be had. Another lever near the upper part of the frame controls the spark advance and raises the exhaust valve for ease in starting. A 10-in. fan cools the motor. It is mounted at the side and runs on ball bearings, at high speed.

The engine is almost free from vibration and has a speed range of 150 to 400 r. p. m. on the countershaft. The

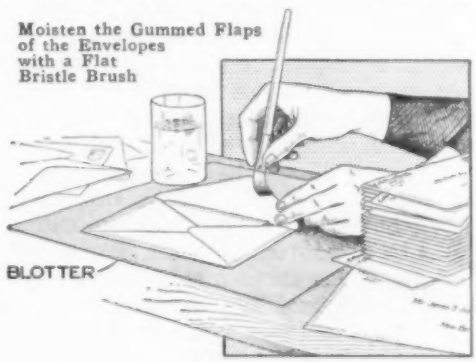


An Old Motorcycle Engine was Mounted on a Frame and Skids for Use as a Stationary Engine That could be Moved Readily

whole arrangement as shown weighs about 200 lb. and develops steady power. An axle at the end of the skids makes it convenient to mount small wheels on it, for transporting the engine.—Jay M. Hare, Delphos, Kan.

Sanitary Method of Sealing Envelopes

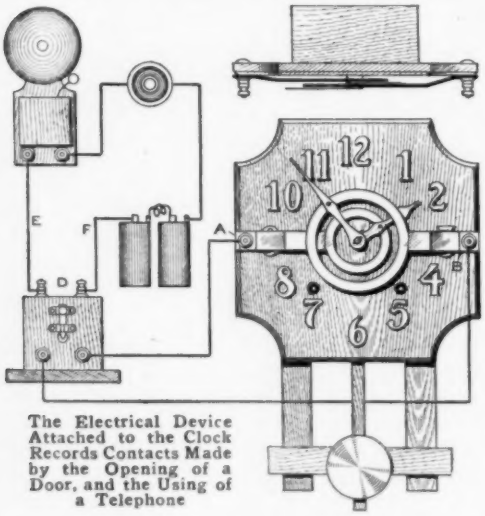
Having quite a number of envelopes to seal, and not wishing continuously to sample the taste of the particular brand of mucilage with which they were gummed, I used a small, flat bristle brush with excellent results. A brush can be had just wide enough to moisten the gummed surface without touching any outside surface of the



envelope. This brush method is a great deal better and cleaner than using a sponge.—James M. Kane, Doylestown, Pennsylvania.

Clock Device to Record Time of Appointments and Other Events

An ordinary clock, fitted with an electrical device to record the length of telephone conversations or appointment hours, or indicate when a door is opened, is shown in the illustration. The record is made by the hands in contact with brass rings attached to the face of the clock, the front of the rings being covered with white paper, dipped in a chemical, on which black dots are caused to appear, at each contact. By examining the dots and noting the items corresponding to them on a memorandum, the length of conversations, etc., may be observed.



The Electrical Device Attached to the Clock Records Contacts Made by the Opening of a Door, and the Using of a Telephone

Two rings of 1/16-in. brass, one within the other, and having side arms, are mounted on the front of the clock, as shown in the illustration. The ring on arm A should be slipped under both hands, and should have spring enough to hold it in contact with the small clock hand. The ring fixed to arm B must be in contact with the large hand, but must be some distance from the small hand and the smaller ring, so that they will not come into contact when the hands cross each other. An offset in the arm A, and a piece of mica insulation, are provided where the larger ring crosses the bar A. On the surface of each ring, between it and its respective hand, is glued a piece of white paper, cut to conform with the ring, but 1/16 in. larger, so as to extend over the outer edge of the brass rings. The rings of paper are saturated in a solution of potassium chloride and permitted to dry, before being placed on the brass rings.

A high-tension current, passing through the coil D, enters the arm A, passes to the small hand, to the large hand, and out at the terminal on arm B. Black dots will appear on the prepared paper at the position of the hands, when the contact is made.

The primary wires E and F may be attached to a doorbell or to a contact on the door, indicating on the prepared paper the length of time the door was held open, as well as the time at which it was opened. The arms A and B must be well insulated from one another. For greater accuracy in recording time, to within 1/2 minute, prepared paper dials, with hour and minute marks, coming into contact with the hands at small projections punched in the hands from their upper surfaces, should be used. An ordinary secondary coil from an automobile may be used, and if the clock has a wooden case, the arms may be fastened directly to it.

Practical Memorandum for Odd Jobs

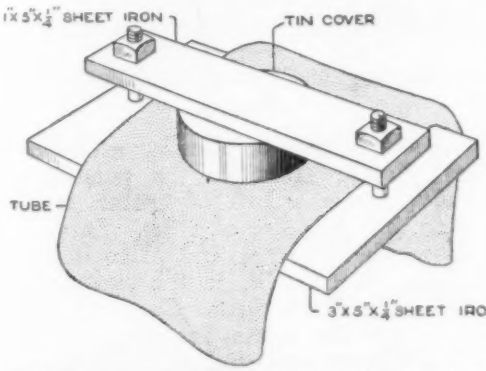
Not infrequently home or shop mechanics find that trifling odd jobs are neglected repeatedly, simply because they are not of sufficient consequence to warrant getting out the tools or materials necessary for the work. A convenient method of insuring that these small jobs are not overlooked is to make a memorandum of them and place it with the tools required for the work. For instance, if a small job of soldering is to be done, a memorandum placed with the soldering outfit will not easily be overlooked, and the work may be done while the coppers are hot for use in a larger job. Likewise with small painting jobs. Sometimes only a brushful of paint is needed and one does not care to mix a small quantity

of paint nor clean the brush afterward. A memorandum of the job makes this unnecessary.—John Hoeck, Alameda, California.

A Homemade Vulcanizer

Tire tubes may be vulcanized satisfactorily in the home garage, or even on the road, with the simple device shown in the sketch. It is made as follows: Obtain a piece of sheet iron, ¼ in. thick, 3 in. wide, and 5 in. long. Drill a ¼-in. hole at the middle of each end. Fit a strip of similar stock, 1 in. wide and 5 in. long, to the first piece with bolts, as shown. Procure a tin cover without embossing on the top, such as is used on baking-powder cans. Cut several disks to fit in the cover, from heavy cardboard; soak them thoroughly in a saturated solution of saltpeter, and dry them. Wrap each disk in oiled paper, and keep them in a water-tight container.

To use the vulcanizer, clean the area around the hole in the tube with sandpaper, and cut a piece of rubber of the proper size to fit over it. Slip one of the prepared cardboard disks into the tin cover, and clamp the cover and tire with patch into the iron frame, as shown. Touch a lighted match to

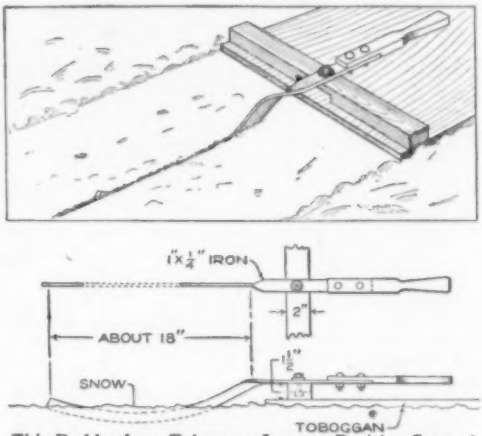


This Homemade Vulcanizer Utilizes the Heat from a Slowly Burning Disk of Cardboard

the cardboard disk, which will burn rapidly, but without flame, supplying sufficient heat to vulcanize the tube.—Thomas W. Benson, Hastings on Hudson, N. Y.

Rudder for a Toboggan

Learning to steer a toboggan by means of the foot dragged behind it is an interesting feature of the sport, but this method is dangerous at times and



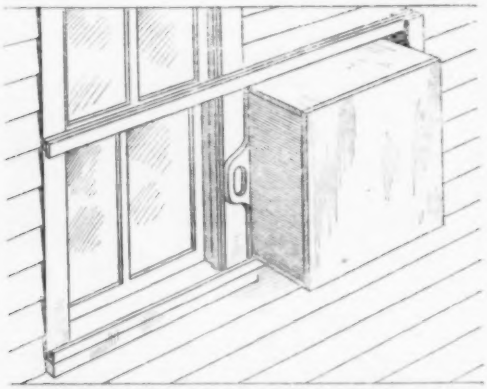
This Rudder for a Toboggan Insures Positive Control, and Prevents Wear on the Shoes and Clothes of the Rider

results in much wear on shoes and clothes. The device shown in the illustration makes this method of steering unnecessary and gives the rider accurate control over the sled. It consists of a strip of ¼ by 1-in. iron curved to form a rudder at one end and twisted at the middle to provide a flat piece for pivoting it on the rear cleat of the sled, as shown in the working drawing below. A handle is fastened to the front end of the strip with bolts. The rudder should not be curved too deeply or it will cut through the snow and be damaged, or ruin the track.—H. B. McIntyre, Waterville, Me.

A Window Refrigerator

A simple method of constructing a window refrigerator that will not obstruct the light is shown in the illustration. A box was made the width of the window and was fitted to slides fastened outside the window on the side of the house. The exposed sides of the box were inclosed completely and the inner side was provided with two sliding doors. A handle was fitted to the side of the box so that,

by reaching out of the window, the box could be drawn in front of the opening easily. Several shelves were

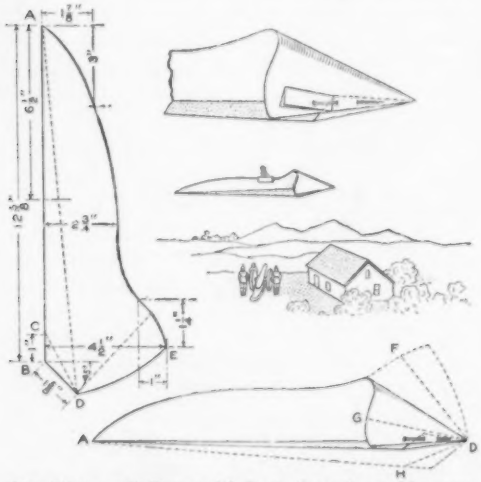


A Box Fitted on the Outside of the Window to Slide in Grooves Provides a Convenient and Inexpensive Refrigerator for Winter Use

fitted into it and the materials stored were not easily molested. Trunk casters attached to the bottom of the box improved the action on the lower rail.—Hubert Kann, Pittsburgh, Pa.

Toy Paper Glider Carefully Designed

A paper glider is an interesting and useful toy that can be made quickly;



The Glider will Travel 30 Feet, Carrying a Message, if Carefully Made

it may be used out of doors, but occasions when weather conditions make it necessary to remain indoors are especially good for this form of pastime. The glider shown in the sketch was worked out after considerable testing. With a toss it travels 20 to 30 ft., on a level keel, with a message slipped behind a pin, as shown in the upper sketch. The inventive boy may devise many play uses for the glider, in tournaments, competitions, and for "military" flights, in which the "drivers" of the devices may "annihilate armies." Practical use of the toy was made in a series of air-current tests.

The glider is made as follows: Fold a piece of paper, 10 by 15 in., lengthwise, and mark the outline shown at the left upon it. The dimensions should be followed carefully. Measure first from the end A to the point B, and then draw the slanting line to D, at an angle of 45°. Mark the width to E, and measure the other distances from A and at the middle, to determine the curve of the edge. Mark the dotted lines extending from D, which are guides for the folding of the paper to form the glider, as shown in the lower sketch. Curl the points under the side so that the line FD comes to the position DG, and pin them to the corners H, as shown in the lower sketch. The glider is tossed by holding it between the thumb and forefinger at the middle of the fold underneath it.—S. R. Edwards, Seattle, Wash.

Cleaning a Clock with Kerosene Fumes

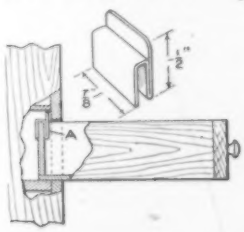
A simple way of cleaning a clock is as follows: Remove the pendulum, and procure a ball of cotton wool, about half the size of a fist. Saturate this with kerosene, and place it in a saucer, or a tin lid, in the case under the works of the clock. Close the case, and leave the cotton for several days. It will then be found that the fumes from the kerosene have brought down the dust from the works; in fact, the cotton will be covered with black specks. It only remains to oil the bearings of the works, and the clock will be quite in order.—S. Leonard Bastin, Bournemouth, England.

Preserving Leaves in Specimen Book

The common method of preserving leaves by pressing them with an iron rubbed on beeswax may be improved by substituting the following process. Paint the under side of each leaf with linseed oil, ironing it immediately, and then paint and iron the upper side in the same way. This treatment gives the leaves sufficient gloss, while they remain quite pliable. It is not necessary to press and dry the leaves beforehand, but this may be done if desired. The tints may even be well preserved by painting only the upper side of the leaves with the oil and then placing them, without ironing, between newspapers, under weights, to dry.—Caroline Bollerer, New Britain, Conn.

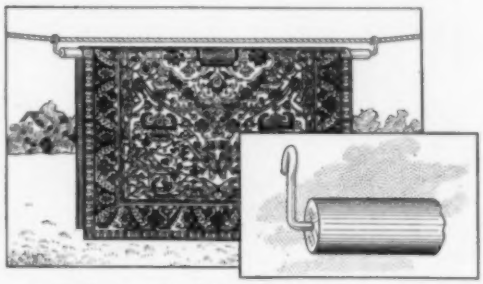
Removable Drawer Stop

When I least expected it, the small-tool drawers of my tool chest have often dropped out, after I had left them partly open. The result was a waste of time in picking up the tools, not to mention the possible injury to them. I made small clips, like that shown in the sketch, and fitted them to the back of the drawers, as at A. When it is desired to remove the clips, the portion that extends above the drawer may be bent forward. This is necessary only where the space above the drawer is small. The clips may be made large enough to fit drawers of various sizes.—J. Harger, Honolulu, H. I.



Pole Supports Rug Handily for Cleaning

A rug may be handled easily for cleaning if the pole on which it is rolled when purchased is used as a support, as shown in the illustration. Two stout wires are fastened into the ends of the pole and hooked over the tightly stretched clothesline. The rug is suspended on the roller and is thus kept straight while it is cleaned, the tendency being, when only a clothesline is used, to crumple at the middle.—John V. Loeffler, Evansville, Ind.



The Roller on Which the Rug is Rolled When Purchased is Used to Advantage as a Support While Cleaning It

Disk Talking Machine as China-Banding Wheel

A serviceable wheel for banding hand-painted china may be had by adapting a disk talking machine for the purpose. Three old records are placed on the wheel, so as to bring the surface of the upper one slightly higher than the center pin. The piece of china to be banded is placed on the exact center of the disk, with the rings on the record as a guide, and the brush may be rested on the arm of the machine. Care must, of course, be taken not to injure the talking machine.—Mrs. W. Read Elmer, Bridgeton, N. J.

Emergency Collar Button

Requiring a collar button, and, as usual, having no extra one on hand, I devised the holder shown in the illustration. It proved to be better than a collar button for use at the back of the neckband. It was bent into shape from a hairpin and has the advantage of keeping the collar fixed with little chance of becoming unfastened.—William S. Thompson, Hopkinsville, Ky.

VARIED EXTERIOR FINISHES FOR FRAME HOMES

By Laying Every Third Weatherboard so That Almost the Whole of Its Outer Surface is Exposed, Pronounced Horizontal Lines have been Produced on This Bungalow

A Pleasing Combination Consisting of a Shingled Wall and a Base Made Prominent by Clapboards Laid in Groups of Three

Long Shingles, or Shakes, have been Used on the Lower Portions of These Walls and Smaller Shingles on the Upper Portions to Give This Bungalow an Exterior That Is Quite Out of the Ordinary

Individuality has been Secured in This Structure's Appearance by Alternating Wide Shingle Courses with Narrow Ones and Making a Border of Two Narrow Rows under the Eaves

Here an Unusual but Pleasing Effect has been Produced by Using Shingles of Many Widths Laid in Irregular Courses

Above Is a Dwelling, with Shake-Covered Walls, Which would Be Almost Severely Plain but for Its Vine-Clad Veranda. These Shakes are Exposed 16 Inches